MARINE REVIEW

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DEATH OF CAPT. THOMAS WILSON.

Capt. Thomas Wilson, whose death was announced briefly by cable from Jerusalem a few days ago, was in the front rank of men who have developed the great shipping interests of the lakes. From a hundred young men in vessel circles in Cleveland alone, all of the kind that strive to do what is right, the expression "I have lost a good friend" has been repeatedly heard during the past few days. Capt. Wilson was a Christian gentleman. He had earned distinction from a most humble beginning and was always anxious to extend a hand to those who were following the course that he had traveled. In the councils of vessel men and in the affairs of other commercial organizations with which he was connected, he was a strong, broad man, always standing for what was right. He took an active part in all matters of a public nature in which the vessel owners of the lakes were involved, and also in questions of a shipping kind coming before the Cleveland Chamber of Commerce. He was an eminent citizen of Cleveland—president of one of the large national banks and interested in many other local enterprises. He was one of the first presidents of the Lake Carriers' Association, and when he was present at the important meetings of the executive officers of that organization in Cleveland, he was invariably honored by being selected to preside. No one in Cleveland could be missed more than Capt. Wilson by the charitable organizations and by hundreds of poor people whom he looked after for years. He died on the eve of what would certainly be the most successful year of his life. He had been progressive as a vessel owner and had kept up to the times in the kind of vessels that made up the fleet under his control. With the change from wood to steel his old vessels were gradually disposed of and replaced by modern steel ships, some of them among the finest afloat. Even now two steel steamers are being built at Port Huron for the Wilson company and the fleet next season will consist of some fifteen or sixteen of the best vessels on the lakes.

With freight contracts and other business affairs fixed for the coming year, Capt. Wilson arranged with his wife and daughter for a Mediterranean trip with especial thought of a visit to the Holy Land. They stopped at Philadelphia before sailing and were joined by Capt. Wilson's sister, Miss Annie Wilson, of that city. He did not die among strangers, as there were several Cleveland friends aboard the vessel in addition to the members of his own family, but it is peculiarly distressing that death should come so sudden and under such strange circumstances. The cable gives pneumonia as the cause of death, but there are no particulars as yet. Capt. Wilson had not been in the best of health for a couple of years past, but he was of great stature and a rugged disposition, and there were no indications of a serious nature in his illness. He had taken more recreation than most of the vessel men of late and was planning, after another year, to gradually give up a large part of his business cares.

CAPT. THOMAS WILSON.

At a largely-attended meeting of members of the Lake Carriers' Association in Cleveland on Tuesday of this week it was decided to make no definite arrangements for the part the vessel men will take in the funeral until the remains arrive in New York about two weeks hence. The funeral party will be met in New York by President W. C. Farrington of Buffalo, Wm. Livingstone of Detroit, H. A. Hawgood of Cleveland and J. G. Keith of Chicago, all members of the Lake Carriers' Association. Appropriate resolutions will be prepared by H. Coulby, B. L. Pennington, J. J. H. Brown and Harvey D. Goulder.

Capt. Thomas Wilson was born in Fifeshire, Scotland, Oct. 31, 1838, his father, who was also Thomas Wilson, being a seafaring man. He lived at Fifeshire and at Gwedore, in the north of Ireland, until 1854, when the family moved to America and settled in Philadelphia. Following the training of his youth, Thomas Wilson took to the sea, and for three years sailed on salt water, starting as a ship boy. From there he came to the great lakes, and in the schooner days sailed to Lake Superior and traded along the north shore. His advancement in the command of vessels was rapid, and as a young man he was in charge of some of the finest passenger steamers engaged in the Lake Superior service, among them the Mineral Rock and Meteor. The initial vessel of the Wilson fleet was the steamer D. M. Wilson, built at St. Clair, Mich., in 1873. Since that time Capt. Wilson has given attention almost entirely to the construction and management of vessels. His investments at times extended to iron mining property and to interests in ship building and dry dock plants, but it was his policy to put most of his earnings into vessels and to retain control of them in all cases. His success was largely due to this plan of concentrating his energies as well as his property.

TO CARRY IRON AND STEEL.

NEW FACTOR ADVANCED IN SUPPORT OF THE PROPOSED ENLARGEMENT OF THE ERIE CANAL—GRAIN INTERESTS NOT ALL IMPORTANT.

Buffalo, March 27.—The turn in canal affairs that is stranger than everything else is that it must be saved, if at all, on account of the demands for it made by the iron and other metal interests of the lakes, rather than by the grain interests. Developments of the past few days have pointed to this solution of the matter so directly that no one can fail to see that the grain interests in the canal are in future to be a rather secondary matter. This fact was in some people's minds as long ago as early last season, but there was not much made of it. Still when the New York commissioners held their session in Buffalo last summer to inquire into the causes of the decline of the commerce of New York city, witnesses were told to bear in mind that the carrying of iron and steel by the canal was sufficiently on the increase to be worth especial attention.

Now comes forward the brass company from Waterbury, Conn., as no minor auxiliary to the Buffalo steel plant and the prospective demand for canal accommodations is very largely increased. It is not announced, but is claimed by people well informed on the subject that the prospect is good of such an early development of the copper plant of the Calumet & Hecla Co. at Black Rock that the mere matter of reducing the ore will, in a short time, be a small part of the company's operations here. Be that as it may, if there was a demand for an enlarged canal when there was no metal of account to carry there is much more demand now from what is already in sight.

We are sorry to be obliged to confess that the state authorities are not so forward with promise of canal development as are other interests to declare their need of it. When the canal committees did their work last season it would have been very much of a damper had it been supposed that they would find the legislature unprepared to take the matter up this winter. It is, of course, stated from pretty good sources that so much preliminary work must be done yet that a bill ordering the work would be either out of the question or a matter of great risk, but there will be room for suspicion of dilatory practices somewhere so long as there is no progress towards the carrying on of the work called for by the governor's canal committee.

Still there is no real reason for the remarks that the canal is on its last legs. There are too many possibilities with such a great enterprise as that. Already the boatmen are figuring on the possibility of carrying grain on a paying business at a rate less than the 3-cent one announced by the roads, and if the latter will stick to their rate all summer, so that the boatmen can be certain of it, they will be likely to come out better than for the roads to use the canal rate as a basis for cut rates, as is always the claim of the boatmen. The opening of the canal on April 16 is early and it is quite likely to be in advance of the first lake fleet, but there are only thirty or forty grain boats here, so that they must come in from tide water before much can be done. There is already quite a fleet loaded in New York at the usual rate of $1 per ton.

Complications sometimes work themselves out fairly well. A month ago it looked dark for the grain-handling interests in harbor, but the sky is as clear as a day in June from that direction now. On the whole, we are doing fairly well all along the line.

JOHN CHAMBERLAIN.

MEETING OF LAKE CARRIERS.

At a meeting of the executive committee of the Lake Carriers' Association together with a few Cleveland members of the association the question of wages of men aboard the vessels for the coming season was taken up, but the representation of vessel interests was not sufficient to decide the matter and it was postponed for two weeks. Arrangements relative to the funeral of Capt. Thos. Wilson, for which the meeting was primarily called, are referred to elsewhere in this issue. It was agreed that the coal bill of lading adopted by the association a year ago should prevail for the coming year, but this will probably not apply to hard coal shipments, in which trade the old bill of lading is preferred by most vessel owners.

Shipping masters at the different ports for the coming season were selected as follows: Chief shipping master, A. R. Rumsey, Cleveland, with W. F. Wall as assistant; J. W. Hanson, Chicago, with M. P. Felt as assistant; W. Lennon, Milwaukee; E. Nesbitt, Buffalo; J. A. Logan, Ashtabula; P. Mitchell, Toledo.

SUBMARINE TORPEDO BOAT HOLLAND.

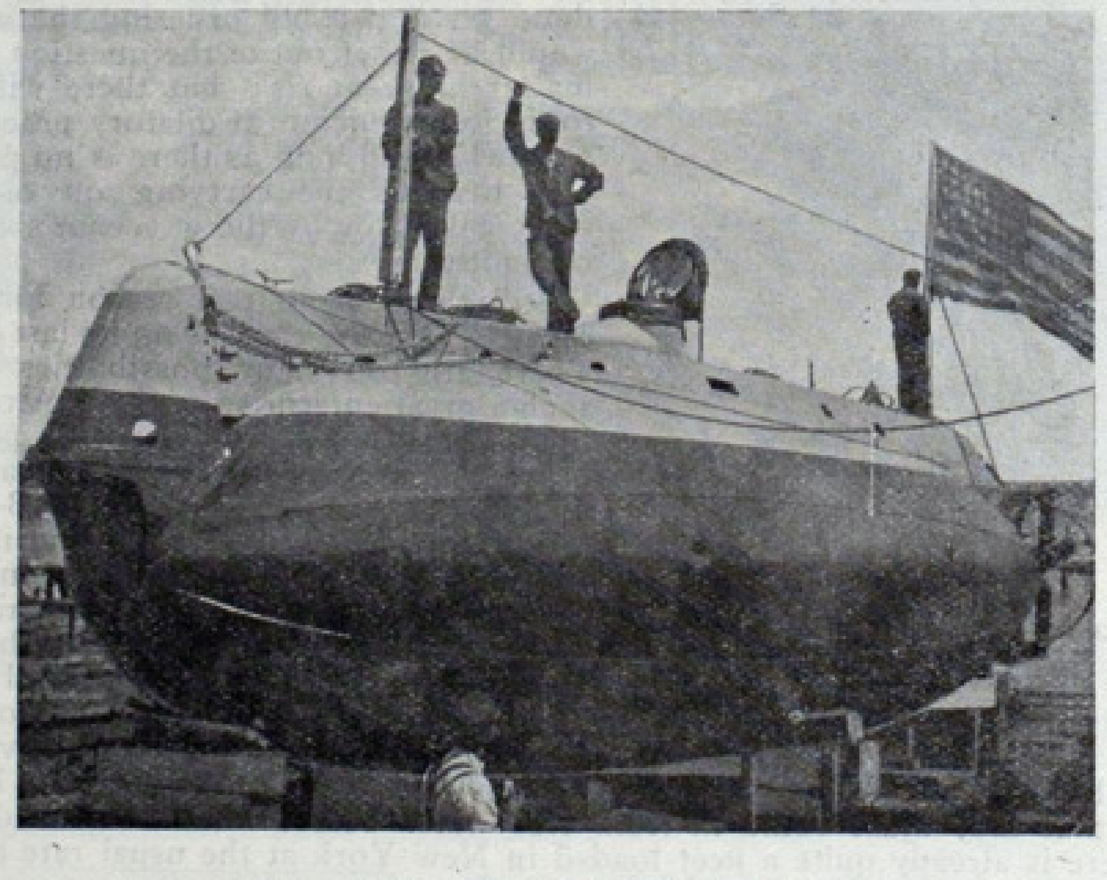
A SERIES OF INTERESTING AND SUCCESSFUL EXPERIMENTS HAS JUST BEEN HELD ON THE POTOMAC.

For months past the submarine torpedo boat Holland has been lying at the navy yard in Washington awaiting favorable weather to perform certain inspection tests for the secretary of the navy and the admiral of the navy. It was expected that the tests would be given months ago, but the unusual rigor of the winter in Washington has prevented it. The Potomac has not, until recently, been free from ice. However, during the past week the river cleared sufficiently to permit the boat to perform its evolutions which were witnessed with the utmost satisfaction by Assistant Secretary Allen, Admiral Dewey, Rear Admiral Rodgers, Commander Kimball, who commanded the torpedo boat flotilla during the late war in Atlantic waters, Judge Advocate General Lemly, Naval Constructor Capps, Naval Constructor Varney, Senator Hale, Senator McMillan, Senator Butler, Senator Tillman, Senator Perkins, Representative Foss of Illinois, Representative Cummings, Representative Talbott of Maryland, Representative Meyer of Louisiana, Representatives Dayton and Dovenor of West Virginia, Representative Clarke of New Hampshire, Representative Bull of Rhode Island, Representative Metcalf of California, Representative Rixey of Virginia, Representative Butler of Pennsylvania and various members of the marine corps.

The course was practically opposite Mt. Vernon and submerged runs were made for distances of a mile or more. The Holland carried staffs 10 feet high with flags attached at both bow and stern to indicate her depth when submerged. She manoeuvred splendidly, running submerged, suddenly coming to the surface and discharging her torpedo and diving again. She executed several quick porpoise like dives to show the facility of handling her in the vertical plane.

The Holland is 53 feet long, 10 feet 8 inches beam and is propelled by a gas engine on the surface and a 50 horse power electric motor supplied by storage battery while submerged. She carries one torpedo tube and three torpedoes. She is also equipped with a dynamite gun for firing aerial torpedoes. Compressed air is carried in steel flasks and supplied to the boat through automatic air valves. The boat is equipped with a 10 horse power electric motor, which operates the bilge pump and is also used for compressing air. Several smaller motors are carried for ventilating purposes. The vessel is trimmed with water ballast, taken into tanks in the bottom of the boat. The depth to which the vessel may sink is regulated by the horizontal rudders. She is guided by a compass in the turret on a level with the eye of the operator. She can maintain a speed of 7 knots either above or below the surface and can remain submerged for twenty hours. Her crew consists of six men.

The interior of the Holland is a model of compactness. One has a curious feeling as he climbs down the turret into the boat, which has room enough for the crew and several passengers besides. The economy of space, however, is a science. The operator stands in the turret and only his legs are visible from the body of the boat. The rest of the crew has each his separate place—one in the stern attending to the gasoline engine, another in the center emptying or filling the big water tanks in the bottom of the boat, another regulating the diving apparatus, and each his prescribed station, for the boat is a wonderful bit of mechanism and must be carefully attended.



SUBMARINE TORPEDO BOAT HOLLAND.

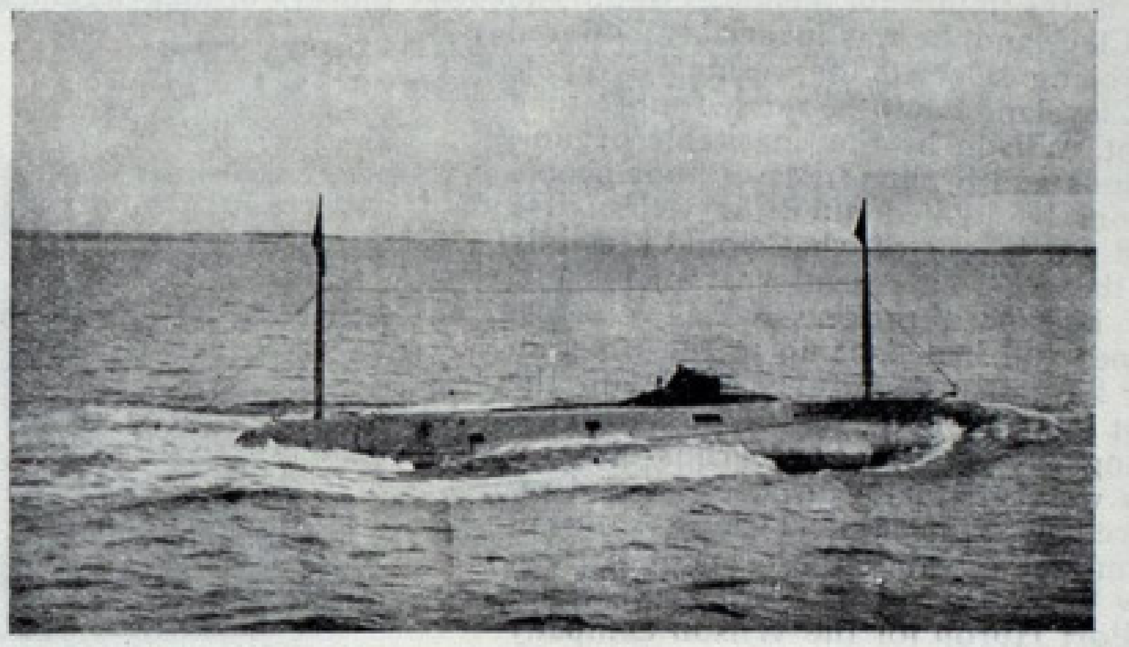
A gage, containing a column of mercury, shows the exact depth to which the boat sinks. It is capable of sinking to a depth of 350 feet and continue navigation. It is romance to think that one may see the fishes through the deadlight overhead or alongside. Out in the sound or in the ocean he can see a green film, nothing more, but which diffuses a pale light throughout the craft; in the Potomac, however, yellow and grimy with mud, one can see nothing whatever and while in the clear waters of the ocean the incandescent lights within the boat may occasionally be turned off they must be kept constantly burning in the river. The sensation of being under water in the Holland is little different from that experienced in the steerage of an ocean liner.

In appearance the Holland is like a diminutive whaleback or a magnified cigar. On the top a flat superstructure is built to afford a walking platform, and it is also utilized for the external outfit of the boat, such as anchors. The boat is constructed of circles of steel about a foot apart. It contains about a dozen openings, by means of which its submerging tanks are filled or emptied or water admitted to its pressure gages. In order to remain under water the boat must be constantly kept in motion, otherwise its reserve buoyancy would bring it to the surface. Empty its storage tanks and the boat will fly to the top of the water.

The compressed air tanks are six in number, containing 30 cubic feet of air at a pressure of 2,000 pounds to the square inch. A smaller tank contains 3 cubic feet of air at 50 pounds pressure. A smaller tank yet contains 2 cubic feet of air at 10 pounds pressure. With the smokeless powder these smaller tanks supply the compressed air which is used in discharging the projectiles from the boat. Compressed air is used in various forms in the little boat. It not only discharges the projectiles, blows the boat loose should it ever get stuck in the mud on the bottom, operate the little engine which drives the steering apparatus, but it empties the submerging tanks as well and feeds oxigen to the crew.

As hitherto stated the boat carries a torpedo tube and dynamite gun. One torpedo is carried in the tube and there is room for two more in the open space at the breech. The breech of the aerial gun is directly above that of the torpedo tube. There is room in the bow for half a dozen projectiles for this aerial gun. Each of these projectiles weighs 222 pounds and carries 100 pounds of guncotton. The gun can shoot these projectiles one mile. The Whitehead torpedoes used have a running capacity of more than half a mile at a speed of 30 knots after they are discharged. Indeed the Holland itself may be called a torpedo guided by human agency instead of by an automatic device.

Strangely enough the Holland may perform its most effective work from the surface. It is so diminutive that it is not likely to be seen in its occasional rises to the surface. It could hurl one of its aerial projectiles filled with guncotton the distance of a mile, and one of these falling near a warship would either sink it or put it out of action.



THE HOLLAND IN CRUISING ORDER.

Regarding the sphere of action of the submarine boat in warfare anything that may be said now is problematical. It seems quite clear, however, that it would make the blockading of a port by an opposing fleet an extremely difficult operation. The only security a battleship would have against a submarine boat would be swift and constant motion. It would be necessary for the fleet to swing incessantly in a wide area and it is doubtful if an effective blockade could be maintained. A battleship, caught unawares, would be an easy prey for the submarine boat. It could rise to the surface when within 200 yards of the big ship, expose merely its turret for a moment, disappear and inside of eight seconds fire its deadly missile. There is absolutely no danger whatever to the submarine boat attendant upon the firing of its own projectiles.

It is only a question of time when the government will have to equip itself with a fleet of these little boats. The board of inspection which witnessed the official tests of the Holland recommended not only the purchase of the boat but the exclusive rights to the patents and a bill was been introduced in congress to purchase twenty of them for the United States navy.

Lieut. Caldwell was aboard the Holland during the trial as the personal representative of Admiral Dewey, and in his report upon the performance he says: "Throughout the performance there was no accident or hitch of any sort, and the ease with which either part of the mechanism was manipulated was particularly impressing. Each member of the crew had a special station, where he remained during the runs. Although these men were all highly skilled and showed a confidence due to their long service in the boat, I think the duties could be easily performed by the petty officers of the navy after a short trial. The boat did not roll and she only pitched slightly at the time of diving, and she righted immediately after attaining the required depth. The torpedo was discharged with the greatest ease. Only a very slight shock occurred to the boat when the torpedo was fired. The captain gave orders to the engineer by the ordinary method of bells and to the torpedo men and pump men by word of mouth. The loud noise made by the gearing of the propelling engine at all times when under way made it necessary for the word to be passed by several men; but at no time was there the slightest confusion or hesitation in obeying orders. When submerged the boat was kept at the chosen depth without any difficulty by means of the horizontal rudder. The evenness of the immersion was well shown by the depth gauges, but must also have been apparent from the other vessels from the positions of the flags. It is worthy of note that from the first immersion the water as seen through the deadlights was entirely opaque, and at the maximum depth it looked almost black. During the nearly three hours we were in the boat the air was entirely sweet."

Admiral Dewey indorsed the report of his representative and expressed the opinion that a determined enemy with a submarine boat of the Holland type, even as she is, could have made the occupation of Manila bay by the admiral's squadron an impossibility.

The clerical force of the St. Mary's Falls canal, under the direction of General Superintendent Joseph Ripley, are engaged in going over the old state canal records and expect with the close of the season of 1900 to publish a report that will show tonnage, vessel passages and all details of the canal traffic back to 1855.

STORY OF THE LYDECKER REPORT.

By the Washington correspondent of the Marine Review.

This story began when the senate of the United States adopted the following resolution on Dec. 13 last:

"That the secretary of war be and he is hereby directed to report to the senate: First, the number of days during the season of 1899 on which navigation was blocked by reason of an accident occurring in St. Mary's river and in the St. Clair canal flats respectively; also the approximate money loss to the vessel interests by reason of such delays. Second, whether in his judgment additional canals should be constructed in the two waterways above mentioned, or in either of them."

After the lapse of a few days the Washington correspondent of the Marine Review received an order from his paper for a copy of the report which Col. G. J. Lydecker of Detroit had made upon the resolution of the senate. Forthwith he called upon Lieut. Col. A. Mackenzie of the war department and thus spake he:

"Colonel, I would like to get a copy of Col. Lydecker's report upon the blockading of St. Mary's channel which the senate requested the secretary of war to make."

"We told Lydecker to hustle that report," replied Col. Mackenzie, "and we expect it along any time now."

A day or two later the correspondent called again and found Col. Mackenzie in the act of editing the report. It was Saturday morning.

"As it is a document called for by the secretary," said the colonel politely, "it will have to be first transmitted to the secretary of war before it is given out for publication."

"When will you transmit it to the secretary of war?"

"I will send it to him this afternoon, but probably too late for him to act upon it today."

The correspondent called on Monday morning upon John C. Scofield, the chief clerk of the war department, and thus spake he:

"Mr. Scofield, I would like to get a copy of Col. Lydecker's report upon the blockading of St. Mary's channel which the senate requested the secretary of war to make."

"As it is a document called for by the senate it must first be sent to the senate before it is given out for publication. This is a rule from which the secretary will not deviate. He is a stickler for the proprieties. The other day a couple of senators endeavored to get some information which congress has called for, but the secretary would not give it to them."

"When will you send the document to the senate?"

"Either this afternoon or tomorrow."

The correspondent called upon the clerk of the document room in the senate at 4 o'clock, which is nearly the hour for closing, and thus spake he:

"I would like to get a copy of Col Lydecker's report upon the blockading of St. Mary's channel which the senate requested the secretary of war to make."

"It has not come to me. Are you sure that it was presented to the senate today?"

"I am reasonably assured."

"Then possibly the secretary to the vice-president has it."

Instantly a call was made upon Frederick Evans, secretary to the vice-president, but that gentleman was at luncheon. A moment later that august body, the senate of the United States, went into executive session, and every one was excluded from the corridors. When the executive session came to an end the secretary to the vice-president had disappeared and the clerk of the document room had not received the report of Col. Lydecker upon the blockading of St. Mary's channel which the senate requested the secretary of war to make.

"I do not think that the report could possibly have reached the senate," said the clerk of the document room, "otherwise I would have had it by this time."

The congressional record the next morning, however, showed that the report had been presented to the senate and that it was ordered printed. Everything that is sent to the printer one day is supposed to be returned to congress the next day and copies thereof placed in the box of each correspondent in the house document room. Exceptions to this rule occur when reports have maps accompanying them, and as the government printing office has no etching plant, these maps have to be let to outside parties, which usually occasions delay. There was no map with the Lydecker report, but yet the report was not in the correspondent's box.

"There must have been a map with it," said the clerk of the document room.

"There was no map," replied the correspondent.

"I don't understand it," said the clerk of the document room, "it is most extraordinary."

If the report was to be published in the forthcoming issue of the Review it would have to be mailed from Washington that very evening, and the correspondent fairly flew over to the war department and called upon the secretary of war and thus spake he:

"I would like to get a copy of Col Lydecker's report upon the blockading of St. Mary's channel which the senate requested the secretary of war to make."

"You will have to see Mr. Scofield, the chief clerk. He has charge of all those matters."

The correspondent entered Mr. Scofield's room quickly and thus spake he:

"I would like to get a copy of Col Lydecker's report upon the blockading of St. Mary's channel which the senate requested the secretary of war to make."

"It has been sent to the senate."

"Yes, yes, but the senate report is delayed in the printing office."

"Well, well, how can I help you? The senate has the report."

"You have the original, and I want permission to copy it."

"I can't give you permission," replied Mr. Scofield. "Our rules are very strict. The matter is entirely in the hands of the chief of engineers."

Brig. Gen. John M. Wilson, the chief of engineers, was talking to a couple of congressmen when the correspondent entered, and thus spake he:

"I would like to get a copy of Col Lydecker's report upon the blockading of St. Mary's channel which the senate requested the secretary of war to make."

"I am very sorry that I cannot accommodate you," replied Gen. Wilson, "but it is beyond my power to give out information of that character."

"There is no objection to its publication, general," explained the correspondent. "It has been presented to the senate and has been ordered printed by that body, but the printers have met with an unaccountable delay in issuing it. Had I been at the senate the day it was presented I could have obtained it there. What I want now is permission to copy the original document which is in your possession."

"I am very sorry I cannot oblige you, but my instructions are quite clear," said the general. "I wish you would read this order from the secretary of war."

The correspondent read for the delectation of the congressmen and the general an order which prohibited the giving out of information concerning the operations of the war department. The correspondent endeavored to argue that the order had to do with information prior to its transmission to the secretary of war or to congress, but had no bearing whatever upon information which had already been transmitted and which was in fact public property.

"I cannot interpret the order; I must simply obey it," said the general. "You will have to see the secretary of war."

The secretary of war was in New York and the forthcoming issue of the Marine Review went to press without the report of Col. Lydecker upon the blockading of St. Mary's channel which the senate requested the secretary of war to make.

There was nothing to do now for a week but to make daily visits to the document room. For four days inquiries were made without tangible results, and as it was growing dangerously near the Review's date of issue an appeal was made to Representative Burton, chairman of the committee on rivers and harbors, to make a demand of the government printing office for a copy of the report of Col. Lydecker upon the blockading of St. Mary's channel which the senate requested the secretary of war to make. A telephone message was straightway sent to the printing office and the cheerful news was received that the printers had been unable to decipher the manuscript and that the whole report had been returned to the war department for a more legible copy. The war department had returned the tabulated part of the report to Detroit. A day was spent in getting this encouraging bit of information, and it became apparent that if the report was to be published in the next issue of the Review it would be necessary to see the secretary of war that afternoon.

"The secretary of war is very busy," said the private secretary, "and he will not see you today."

"I must see him."

"He is very busy and has left orders not to be disturbed. He will see no one."

"He usually sees the correspondents at 4 o'clock."

"Well, if you desire to wait until 4 o'clock you can see him."

As it was then five minutes to 4 o'clock it was extremely unobliging of the clerk not to have informed the visitor that he could see the secretary at four. The refusal to do so might have frustrated the efforts of a person less informed. While the correspondent was waiting Chief Clerk Scofield passed through the room and entered the secretary's office. Promptly at 4 o'clock Secretary Root came out.

"Well, sir, what can I do for you today?"

"Mr. Secretary, I would like to get a copy of Col. Lydecker's report upon the blockading of St. Mary's channel, which the senate requested you to make. The report was transmitted to the senate about ten days ago and should be back from the printer by this time, but owing to illegible manuscript it has been delayed. What I want is permission to copy the original document which is in the possession of the chief of engineers."

"Really I don't know what the etiquette of the proceeding is," replied Secretary Root. "I will consult the chief clerk and you may call tomorrow."

"Unfortunately we go to press tomorrow and it is necessary that I obtain the report tonight. I assure you that the question of etiquette is not involved. I could have obtained the report from the senate had I been at the capitol at the time it was presented. You have ordered the chief of engineers not to give out any information in advance of its presentation to congress, which is an eminently proper thing to do, but the order has no bearing upon this case because the report has already been presented."

Heaven only knows how the dialogue would have ended had not Chief Clerk Scofield come into the room at that moment.

"Ah, here is the chief clerk," said the secretary of war, who appeared to be at a loss for something to say.

"Mr. Scofield," said the correspondent, "I have requested the secretary of war for a copy of the report of Col. Lydecker upon the blockading of St. Mary's channel, which the senate requested him to make, and he refers the question to you to settle the point of etiquette. The report was transmitted to the senate sometime ago, and I have assured the secretary that the point of etiquette is not involved."

"But the report is over at the senate, and how———"

"Yes, but the original is still here and Gen. Wilson says I may have a copy of it if the secretary of war will so direct."

"Did Gen. Wilson say that?"

"Yes, sir."

"Well, I think we may safely leave the matter in the hands of Gen. Wilson."

Secretary Root bowed gravely and Mr. Scofield left the room and dictated an order to Gen. Wilson to the effect that if he saw no objection to the publication of the report of Col. Lydecker upon the blockading of St. Mary's channel, which the senate requested the secretary to make, the secretary saw none.

The note was taken to Col. Mackenzie, who took it to Gen. Wilson, who saw no objection, and the report of Col. Lydecker upon the blockading of St. Mary's channel, which the senate requested the secretary of war to make, was published in the next issue of the Marine Review.

But it was months later before the report came from the printer.

And this story is written to illustrate the trouble it sometimes takes to get the simplest thing in the world.

THE ARMY SECURES TWO NEW TRANSPORTS.

The army secured two new transports last week, which will be incorporated into the permanent transport fleet. They are the auxiliary cruisers Badger and Resolute. These vessels were formerly American merchant steamships, and were purchased by the navy at the beginning of the war with Spain, the Badger two days before hostilities commenced and the Resolute on the very day the war began. The Badger was the Yumuri of the Ward Steamship Co., engaged in carrying passengers and freight between New York and West India ports. She cost the government $367,000. The Resolute was the Yorktown of the Old Dominion Steamship Co., which plied between New York and southern ports. The navy department paid $475,000 for her. Under the arrangement made for their transfer to the army the sum of $842,000 paid out of the war defence fund of $50,000,000 will be charged against the war department's quota of that fund, while the navy department's war fund expenditures will be reduced the same amount. The Badger is on her way to Mare Island, Cal., from South America. The Resolute is at League Island, Pa. These ships were used as transports for marines in the war with Spain.

A REMARKABLE VOYAGE.

The British steamer Indravelli has just completed the longest voyage ever undertaken from the port of Baltimore. Since she left Baltimore a year ago she has steamed to Russian Siberia and return, a distance of 26,268 miles. This is equivalent to nearly nine voyages from Baltimore to England. The Indravelli loaded steel rails at Sparrow's Point for the Siberian railroad. Then she traveled 3,215 miles across the Atlantic to Gibraltar, 1,920 miles through the Mediterranean sea to the Suez canal, 1,310 miles down the Red sea to Aden, 2,130 miles across the Arabian sea to Colombo, 1,560 miles across the Sea of Bengal out through the Straits of Sumatra to Singapore, 2,299 miles through the China, Yellow and Japan seas to the latitude of Shanghai, and then 700 miles to Vladivostock, at the junction of the boundary lines between China and Siberia. After discharging the Indravelli retraced her track and passed Gibraltar again on March 4 for Baltimore. She is to reload rails at Baltimore for Vladivostock. The vessel is a steel tramp, 400 feet long, with a capacity of 5,000 or 6,000 tons of cargo. She hails from Liverpool, and was built in Glasgow in December, 1897. She is probably returning in ballast. When the steamer arrives at the Russian port with her second voyage she will have traveled 39,402 miles in delivering the cargoes.

Armor and Armament of the New Battleships and Cruisers.

BY REAR ADMIRAL CHARLES O'NEIL.

In reply to your letter of March 22, 1900, in which you ask for an article outlining the batteries to be placed upon the three battleships and three armored cruisers authorized by the last congress, I beg to inform you that the board on construction, which decides such matters, has determined that the armament of the battleships shall consist of four 12-inch guns of 40 calibers, to be mounted in pairs in two electrically controlled, elliptical, balanced turrets having inclined port-plates, one forward and one aft, each having an arc of fire of 270 degrees; four 8-inch guns of 45 calibers, in two turrets, one on each side forward of the beam, and having an arc of fire of 145 degrees, that is, from right ahead to 55 degrees abaft the beam; twelve 6-inch 50-caliber guns, two of which will be mounted on the upper deck at the after ends of the superstructure, having an arc of fire of 145 degrees, that is, from right astern to 55 degrees forward of the beam. Ten of the 6-inch guns to be mounted in broadside on the main or gun deck, having an arc of fire of 110 degrees, that is, 55 degrees forward of and 55 degrees abaft the beam, except the two forward guns, which will fire from directly ahead to 55 degrees abaft the beam.

The secondary battery will consist of twelve 14-pounders, twelve 3-pounders, eight 1-pounders, eight machine guns and two field guns, a total of sixty-four guns.

The vessels will also be provided with two underwater torpedo tubes. The speed will be 19 knots, and the coal capacity 2,000 tons.

The armor protection to the hull will consist of a complete water-line belt of Krupp armor, 8 feet wide and over the central portion of the ship. This belt will be 9 inches thick at its upper edge and will carry this thickness downward for a distance of 5 feet, and then taper to 6 inches at the lower edge. Forward and aft of the heavy belt the armor will taper to 4 inches at the bow and stern. Above the main belt the side will be protected with 6-inch armor, which will cover all the 6-inch gun positions. The turrets for the 12-inch guns will be 10 inches thick, except the front plate, which will be 11 inches. The turrets for the 8-inch guns will be 6 inches thick, except the front plate, which will be 6½ inches. The 14-pounder guns will be protected by armor of 2 inches in thickness.

In addition to the above protection, the vessels will carry a complete belt of cellulose and a curved protective deck of 3½ inches thick on the slopes and 2½ inches thick on the flat.

In the circular defining the chief characteristics of the vessels, which will be issued by the department in due time, there will probably be a proviso that the government reserves the right to change the number and caliber of the guns, or the arrangement of the battery, or the thickness and distribution of the armor, at any time within six months after the date of the contract, provided such change does not exceed the weight therein provided for the above named purposes. This will allow time for a proper test of the superimposed system of turrets on the Kearsarge class and leave the department free to adopt them in the later ships, if it seems desirable.

The new ships will have high freeboard, and the after body will be carried to the same height as forward, thus affording abundant space for a flag-officer and his staff, the vessels being designed for flag-ships.

It is not yet fully determined whether these vessels shall be sheathed and coppered or not.

The 12,000-ton cruisers are to have a speed of 22 knots and are to carry 2,000 tons of coal. The battery will consist of four 8-inch 45-caliber guns, mounted in pairs in turrets, one turret forward and one aft, each having an arc of fire of 270 degrees; fourteen 6-inch 50-caliber guns, four of which will be carried on the upper deck, having an arc of fire of 145 degrees, two firing ahead and two astern. On the gun-deck ten 6-inch guns will be mounted, the forward and after pair being sponsoned to obtain end fire and the others in broadside.

The secondary battery will consist of eighteen 14-pounders, twelve 3-pounders, eight 1-pounders, eight machine guns and two field guns, a total of sixty-six guns. The vessels will also be provided with two underwater torpedo tubes.

The armored protection will consist of a complete water-line belt, 7 feet 6 inches wide, 6 inches thick at its upper edge and tapering to 5 inches at the lower edge. This heavy belt extends from the forward to the after turret, and is completed to the stem and stern by 3½-inch armor. Above the belt the side is protected by 5-inch armor, which covers all the 6-inch gun positions. The turrets for the 8-inch guns are of 6-inch armor, except the front plate, which is 6½ inches.

In addition to the above described protection, the vessels will have a complete cellulose belt and a heavy curved protective deck extending the entire length of the ship. This deck will be 4 inches thick on its slopes and 3 inches thick on the flat. The question of sheathing is not yet fully determined.

CHARLES O'NEIL,
President of Board.

Washington, D. C., March 27, 1900.

The United States army transport Sumner, which sails this week from New York with a detachment of troops for the Philippines, is in appointments and equipment the model transport of the world. She is fitted throughout with the latest improved Davidson pumps and auxiliary condenser and has complete Baird fresh water distilling apparatus, double equipment, each of 3000 gallons daily capacity, manufactured by M. T. Davidson of New York City.

W. J. Rainey, of Cleveland, the well known Connellsville coke operator, died at Johns Hopkins hospital at Baltimore, Tuesday night, March 27, from the effects of an operation. He was 63 years old.

Francis J. Clergue of Sault Ste. Marie, Ont., who is the leading spirit in the power canal project at the Sault, is also at the head of a company that is building a railroad and developing iron mines just above the Sault in Canada. He says that four steamers now building in England, and which will be engaged in carrying the ore down the lakes, will arrive at Montreal during the early summer, just about in time to pass up to the lakes through the new St. Lawrence canal locks. There are to be twelve of the steamers built, all of them of St. Lawrence canal dimensions—about 258 feet keel and 36 feet beam. It is the intention, Mr. Clergue says, to send the vessels to the Atlantic for winter service.

MASTERS AND ENGINEERS.

APPOINTMENTS OF OFFICERS FOR SHIPS OF THE GREAT LAKES, SEASON OF 1900.

Anchor Line, E. T. Evans, Manager, Buffalo: Steamers—India, Capt. P. O'Neil, Engineer Dan'l Donohue; China, Capt. Chas. Christy, Engineer Jno. Wise; Japan, Capt. John Doherty, Engineer Wm. Wilson; Alaska, Capt. Edward Martin, Engineer E. S. Davis; Wissahickon, Capt. John McCarthy, Engineer Fred Rehbaum; Delaware Capt. J. H. McAvoy, Engineer Albert Edgar; Juniata, Capt. Geo. Delaney, Engineer John Forrester; Conestoga, Capt. H. Cronkhite, Engineer A. E. Welch; Lycoming, Capt. L. Wright, Engineer A. J. Jones; Conemaugh, Capt. F. Bloom, Engineer Wm. Millington; Lehigh, Capt. J. H. Beroul, Engineer Tim. Griffin; Clarion, Capt. Chas. Nelson, Engineer Jas. Erskine; Susquehanna, Capt. Dall Ryder, Engineer Geo. McLeod; Codorus, Capt. A. McKenzie, Engineer Wm. J. Swain; Schuylkill, Capt. H. O. Miller, Engineer Jno. Jordan; Mahoning, Capt. John Corcoran, Engineer Wm. A. Black.

Western Transit Co., Buffalo, N. Y.: Steamers—Arabia, Capt. H. L. Dennis, Engineer Wm. C. Gilbert; Auburn, Capt. Ed. Roberts, Engineer Wm. McNulty; Boston, Capt. F. J. McCabe, Engineer Patrick Welch; Buffalo, Capt. Robert Murray, Engineer Henry Hess; Chicago, Capt. Jno. Davis, Engineer Wm. Tibbey; Commodore, Capt. Thos. Slattery, Engineer Jas. Brooks; Hudson, Capt. A. J. McDonald, Engineer Mose Trouton; Montana, Capt. Henry Murphy, Engineer Geo. H. Blienby; Mohawk, Capt. S. R. Jones, Engineer Frank Miller; Milwaukee, Capt. Michael Folan, Engineer Jno. Raney; Syracuse, Capt. Jno. Fisher, Engineer Jno. Mark; Troy, Capt. Donald Gilles, Engineer M. J. Laney; Vanderbilt, Capt. F. D. Osborne, Engineer Fred Hail.

Northern Navigation Co. of Ontario, Ltd., Collingwood, Ont.: Steamers—Majestic, Capt. P. M. Campbell, Engineer J. W. Aston; City of Collingwood, Capt. W. J. Bassett, Engineer C. Robertson; Germanic, Capt. R. D. Foote, Engineer Jas. Aston; City of Midland, Capt. F. X. LaFrance, Engineer Wm. Whiffas; Atlantic, Capt. Jas. Wilson, Engineer F. Cleland; City of Parry Sound, Capt. E. Walton, Engineer J. L. Smith; Brittanic, Capt. Chas. Jacques, Engineer S. Beatty; City of Toronto, Capt. John O'Donnell, Engineer D. McQuade.

Boland, John J., Buffalo: Steamers—W. C. Wetmore, Capt. David O'Hagan, Engineer Thos. Leitch; Garden City, Capt. W. E. Clarke, Engineer Wm. Brinker; Westford, Capt. John O'Hagan, Engineer J. Butler. Schooners—Brunette, Capt. J. Radigan; Manitowoc, Capt. Hugh O'Hagan; Monitor, Capt. Alex. McLean; Atmosphere, Capt. M. Lynch; J. C. King, Capt. Alfred Nerburn; John Magee, Capt. ———; L. S. Porter, Capt. ———; Rob Roy, Capt. ———.

Whitney, D., Jr., Detroit: Steamers—E. W. Oglebay, Capt. W. H. Hutcheson, Engineer G. Thos. Francomb; Mecosta, Capt. A. C. May, Engineer Geo. Francomb; Lansing, Capt. Chas. Miner, Engineer Chas. Murett; D. C. Whitney, Capt. Thos. Brady, Engineer Chas. Francomb; Nipigon, Capt. James Mayer, Engineer Chas. Francomb; Merida, Capt. J. H. Ivers, Engineer Edward Egan. Schooner—Melbourne, Capt. Geo. Cooper.

Vance, David, & Co., Milwaukee: Steamers—Frank L. Vance, Capt. E. B. Marquette, Engineer Geo. E. Robinson; Roswell P. Flower, Capt. F. W. Van Patten, Engineer Daniel Darcy; Ferd. Schlesinger, Capt. D. P. Craine, Engineer A. R. Fortier; Maryland, Capt. J. E. Ajax, Engineer M. Crowley; Manchester, Capt. T. Kelly, Engineer James Grant.

Brittain, R. C., Saugatuck, Mich.: Steamers—O. E. Parks, Capt. O. E. Parks, Engineer F. Redmer; Charles McVea, Capt. W. Fumbull, Engineer H. Binder; J. S. Crouse, Capt. Alex Shiner, Engineer A. Schuman; Frank Woods, Capt. R. C. Brittain, Engineer H. Rundell; Mae Martell, Capt. F. Lopel, Engineer W. Rhoda.

Mills, N. & B., Marysville, Mich.: Steamers—Havana, Capt. Thos. Derringer, Engineer ———; Sparta, Capt. Alex. Johnston, Engineer ———; N. Mills, Capt. Dan Warwick, Engineer ———; J. E. Mills, Capt. J. A. Ellery, Engineer ———. Schooners—Biwabik, Capt. James Edwards; A. Anderson, Capt. ———.

Williams, H. W., Trans. Co., So. Haven, Mich.: Steamers—Darius Cole, Capt. Chas. McIntosh, Engineer P. Knaggs; City of Kalamazoo, Capt. David Morris, Engineer Chas. La Bounty; H. W. Williams, Capt. Frank Swails, Engineer ———; Glenn, Capt. L. Cross, Engineer Ralph Peterson.

Michigan Central R. R. Co., James R. Innes, Superintendent, Detroit: Steamers—Transfer, Capt. James R. Innes, Engineer Arthur O. Barton; Transport, Capt. Chas. B. Crawford, Engineer John Cockburn; Michigan Central, Capt. ———, Engineer Alex. Perry.

Vulcan Trans. Co., Jas. Findlater, Secretary, Detroit: Steamers—Forest City, Capt. Joseph Sanders, Engineer Hugh Buchanan; R. J. Hackett, Capt. Thos. H. Sanders, Engineer Jas. H. Foster. Schooner—Wm. McGregor, Capt. Alex. Glen.

Mona Trans. Co., W. W. Brown, Manager, Cleveland: Steamers—Geo. Presley, Capt. C. D. Woodward, Engineer Hayner; Fedora, Capt. F. A. Fick, Engineer J. J. Stevens. Schooner—Nellie Redington, Capt. S. LeBran.

Chicago & Michigan City Line, E. C. Dunbar, General Manager, Grand Haven, Mich.: Steamers—America, Capt. John Martin, Engineer Amos Vaughn; A. B. Taylor, Capt. ———, Engineer ———.

Matthew's Line, Toronto, Ont.: Steamer—Clinton, Capt. P. J. Shaw, Engineer Geo. Wilcox. Schooners—Grimsby, Capt. Henry Brooks; Emerald, Capt. John Joyce; Clara Youell, Capt. ———.

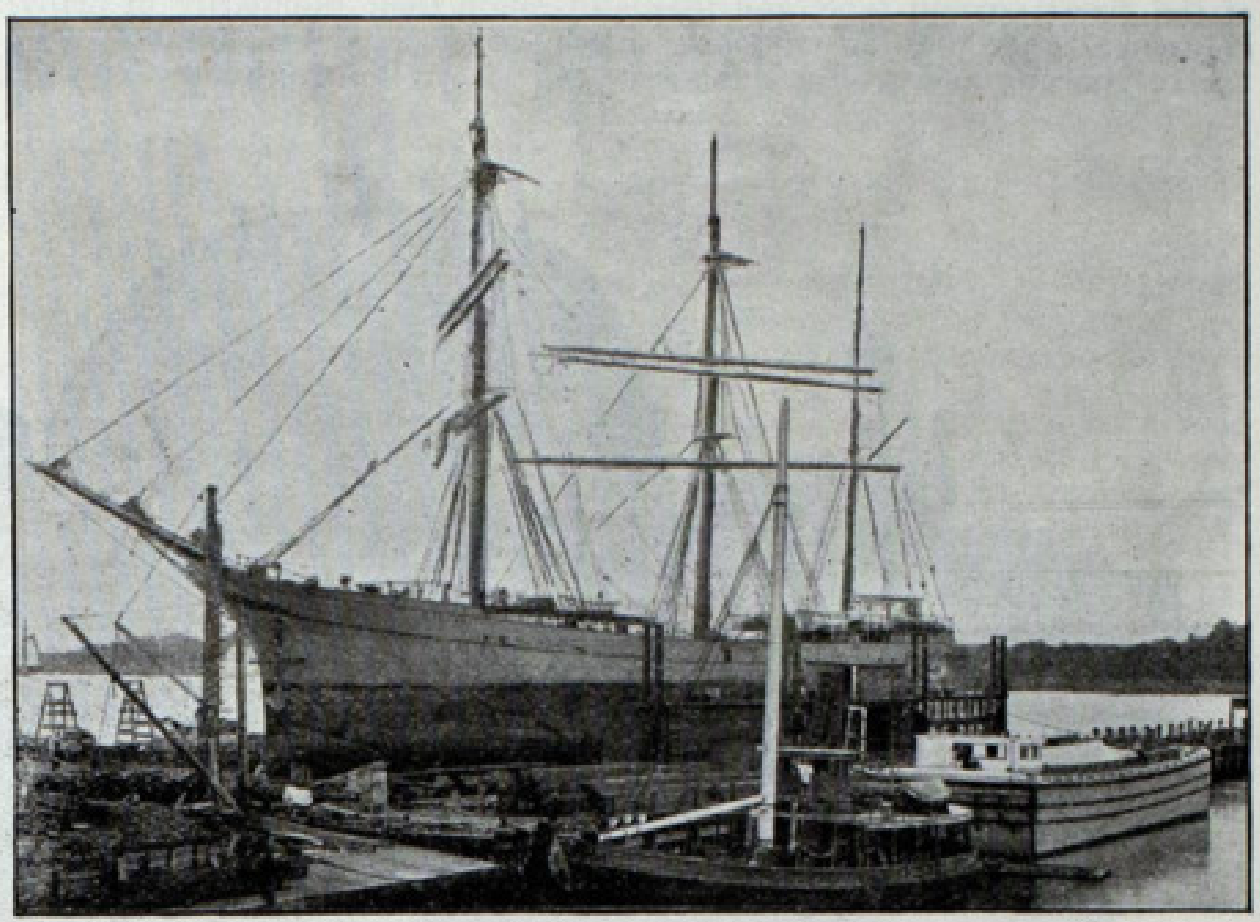
North West Transit Co., Sarnia, Ont.: Steamers—Monarch, Capt. E. Robertson, Engineer Thos. Bard; United Empire, Capt. John McNab, Engineer S. Brisbin.

Griffin, M. B., Saugatuck, Mich.: Steamers—Saugatuck, Capt. John Campbell, Engineer Wm. Bradley; Charles McVea, Capt. Wm. Turnbull, Engineer Henry Bender.

Plathner, Theo., Milwaukee: Steamer—Emma E. Thompson, Capt. Henry Bennett, Engineer Frank Kimber. Schooner—La Petite, Capt. Wm. Glockner.

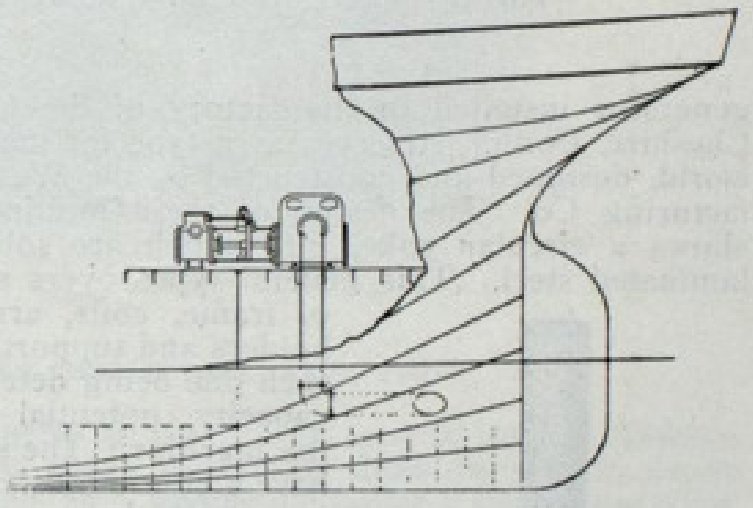
M'WILLIAMS DOCK YARD.

Frank McWilliams, who operates a balance dry dock and ship yard at West New Brighton, Staten Island, N. Y., with offices at No. 1 Broadway, New York City, has made unusual progress of late in the construction and repair of wooden vessels. A view of his works is shown in the engraving printed herewith. His floating balance dry dock is of about 2000 tons capacity. It is 210 feet over all, 80 feet width and 10 feet draught. He has docked steel vessels of 240 feet length.


WORKS OF FRANK M'WILLIAMS, STATEN ISLAND, N. Y.

POWER FROM PUMPS OF TOW BARGES.

Editor Marine Review:—We all know that our lake tow barges are, as a rule, a helpless class of vessels when separated from the towing steamers. I refer particularly to the big steel tow barges that have been building for some time past without canvas of any kind to be used in case they are cast adrift in a storm. Would it not be a good plan to utilize what power these vessels have at their command to at least avoid the risk of losing hatches and otherwise becoming disabled if caught in the trough of the sea after being cast adrift? This could be done by running the discharge pipes from their large ballast pumps out at the stern close to the rudder on either side of stern post. A vessel so fitted would without doubt have sufficient power in this discharge to maintain headway, especially in the direction away from the storm. Experiments made by a professor at one of the principal technical schools of the country have demonstrated that large streams at low pressures do the most economical work in hydraulic propulsion.



Sufferings of the crew of the whaleback barge that drifted to the north shore of Lake Superior last fall and was lost furnish one instance of the necessity of providing controlling power for towing craft, and with this pumping power on hand it would seem that the extension of the discharge pipes to a point below light-water mark is a small matter when the advantage to be attained is taken into account. Then, too, it is certain that the captains of these large barges often wish they had motive power of some kind when in running the rivers they find their vessels starting across channel while they can do absolutely nothing to prevent it.

JOHN W. McEACHREN.

Cleveland, March 26, 1900.

DETROIT'S NEW TOOL WORKS.

The moving of the St. Louis works of the Chicago Pneumatic Tool Co. from St. Louis to Detroit is causing quite a stir in Detroit, as there are absolutely no vacant houses suitable for the habitation of workingmen, and where the multitude of employes who accompany this factory will be housed is a problem that the landholders and real estate men are trying to solve. The site of the new works is at the corner of Second avenue and Amsterdam street. The workmen will be conveyed from St. Louis by special trains, and a plan to meet them at Detroit with a brass band and to have a parade is being discussed, but the question of where to lead the procession will, of course, be a doubtful one until the house builders settle the matter of homes. The Chicago company has another large factory at Philadelphia. Detroit is fortunate in securing this industry, as the Chicago company makes every kind of tool that is operated by compressed air, and this is the machinery that is now showing most rapid development in America.

Edward G. Howard of Jeffersonville, Ind., has been awarded the contract for building a government steamer to take the place of the Gen. Barnard on the Mississippi. His bid was $32,000.

The Nickel Plate road offers to the traveling public a great convenience by the sale of the Central Passenger Association mileage ticket, which, besides the Nickel Plate, is honored for passage on thirty-six other roads. Apply to any agent. 48, Apr. 5.

MULTIPOLAR GENERATORS AND MOTORS.

It is an established fact among architects, engineers and manufacturers that improved machinery in most cases necessitates the use of electricity, and further that electric motors and generators can now be purchased with as much certainty of satisfaction as can the boilers and engines of a steam plant. The earliest electro-dynamic generators were of the direct current type, and they still retain their popularity in many industries, since they are efficient, simply constructed and durable.

In the engravings Fig. 1 shows a 56 k. w. Westinghouse 125-volt generator installed in the factory of the Cheshire Manufacturing Co., Cheshire, Conn. It serves as a type for many others in all parts of the world, designed and constructed by the Westinghouse Electric & Manufacturing Co. The design of these multipolar direct-current machines shows a circular yoke, into which are solidly cast the pole pieces of laminated steel. This general type covers several styles of construction of frame, coils, armature, brush holders and supports; the form of each one being determined by the capacity, potential and speed of the machine. The smaller frames have a continuous yoke, the bearing-stands being separable from the main casting. The medium and larger frames are divided in a horizontal plane, the bearing-stands being integral with the lower casting. This method of construction presents advantages for machines carrying armatures of too great weight to be readily moved by hand. With these machines are used self-oiling, self-aligning ball and socket bearings. Upon those machines, which have continuous yokes, the terminals are mounted on the top, and on the sides of those having divided yoke. With small or moderate-sized machine the four-pole construction is used, but in larger sizes the use of six poles provides a better distribution of the ments of the machine. These machines are supported either on rails or a sliding basis; belt-tension being adjusted by moving the machine with a screw.

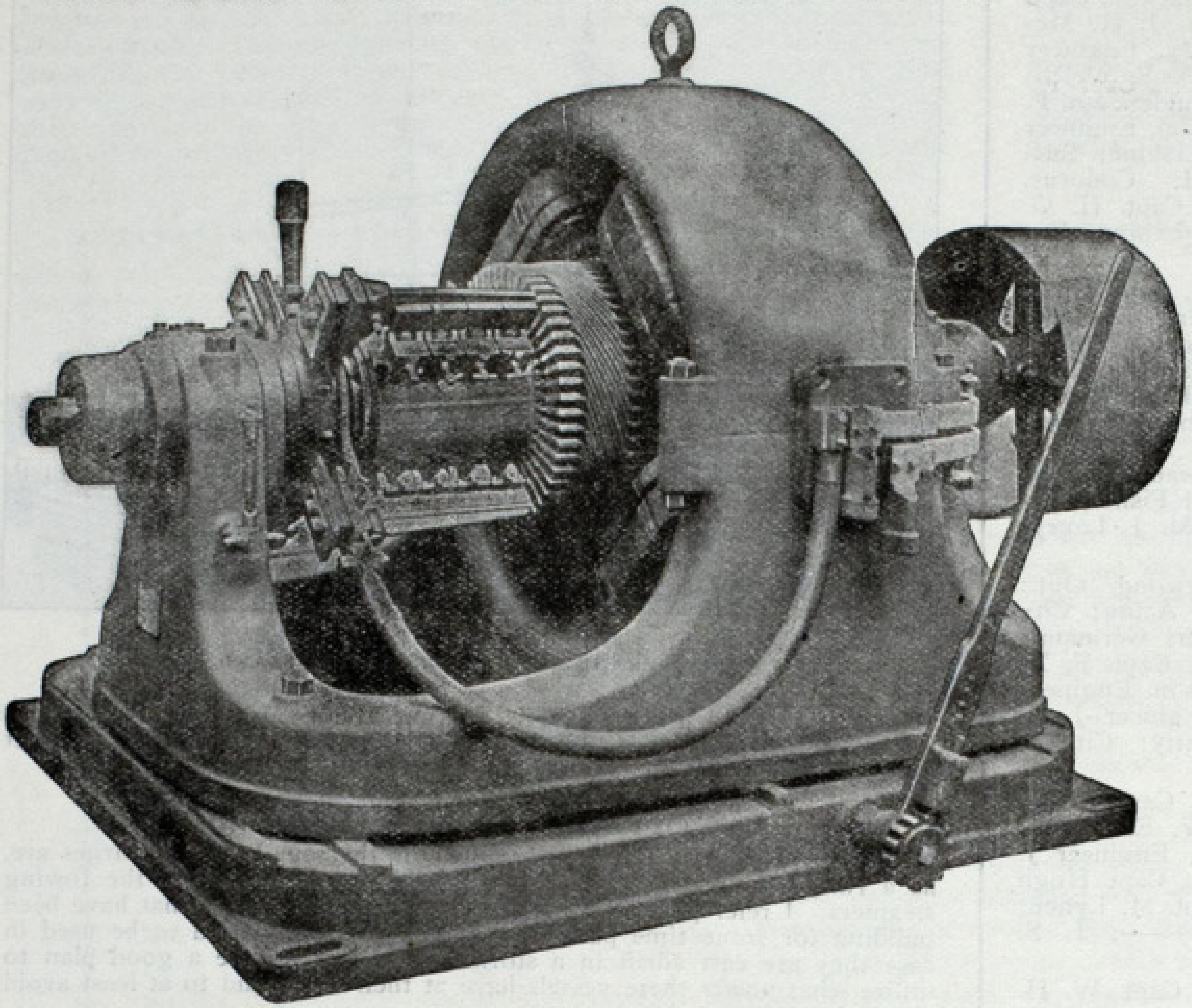


FIG. 1. WESTINGHOUSE 56 K. W. 125 VOLT MULTIPOLAR GENERATOR.

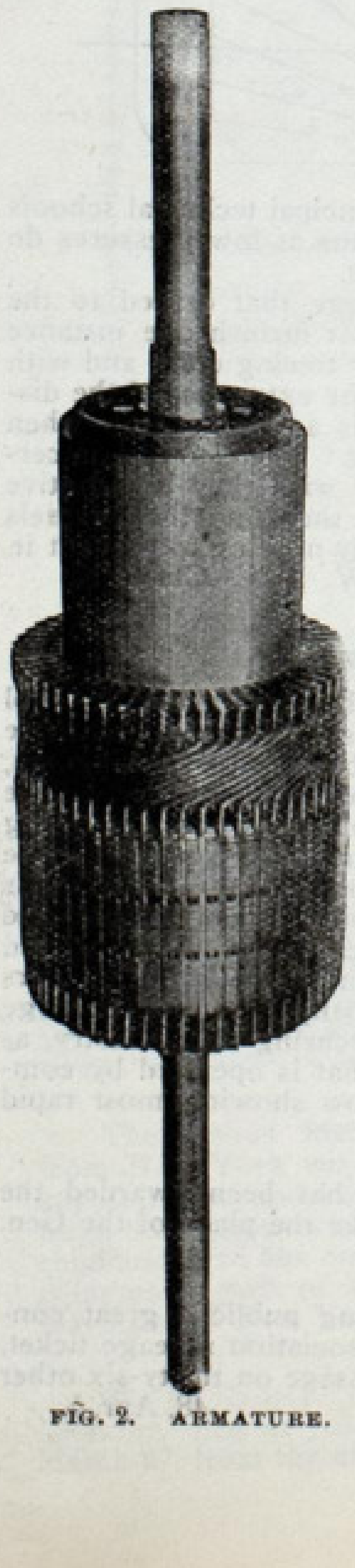


FIG. 2. ARMATURE.

Experience has demonstrated that machine-wound coils are capable of much better mechanical construction, and may be maintained at a much higher state of permanent insulation than is possible to be attained with any method of hand winding. Machine-wound multipolar field coils are used upon all Westinghouse generators and motors of this type. Compound-wound machines have seperately constructed shunt and series coils, the two coils going over the pole piece side by side, and being removable at will. Any standard machine can be furnished with either shunt or compound-wound field winding whenever required, and slow speed motors can be series-wound.

The armature cores are constructed from punched discs of special sheet steel carefully annealed before assembling. Longitudinal openings permit free passage of air through the core, and where the dimensions of the core and coils permit, the ventilation is augmented by ducts perpendicular to the actions of the core. When the machine is running, air is drawn in through the core and forcibly thrown from the ducts through the armature windings against the pole pieces and field coils, thus maintaining the entire machine at an even low temperature.

Three types of armature winding are employed for the different sizes of Westinghouse multipolar generators and motors. In all of them the coils are laid in slots in the core, but the construction of the coils and the method of retaining differ. For small machines, and for medium machines of higher potentials, machine formed wire coils are used, encased in insulating envelopes of prepared fullerboard retained by surface bands. For medium-sized machines armature windings of copper strap with surface bands is employed, the coils being forced into shape before the insulation is applied. The larger armatures have forged wire coils, retained by fibre wedges pressed into notches near the top of the slots in the core. Every coil is continuous throughout its length, the only joint being where it connects with the commutator. The method of winding permits a free circulation of air across the ends of the core through the coils. Fig. 2 shows the armature for a 75 k. w. 125-volt generator. The brushholder design of these machines provides good commutation and freedom from sparking. For machines of the higher potentials a sliding radial holder is used. Low potential machines have holders of very low resistance combined with extreme steadiness and quiet running, which is attained by swivel holders designed to carry heavy currents continuously without noise or undue heating. By using a high-grade carbon brush there results a glossy commutator surface and minimum wear of commutator and brushes.

Great difficulty has frequently been experienced in the operation of large multipolar direct current machines with parallel wound armatures, owing to the difficulty of securing the same magnetic strength in all the poles. The potential generated in the conductors under one pole sometimes exceeded, or was less than that generated in the conductors similarly situated under another pole of the same polarity, the result being a slight difference of potential between brushes of similar polarity, which caused currents, sometimes of considerable magnitude, to flow from one brush to another and from one section of the armature winding to another, attended by annoying and wasteful heating of the conductors and sparking of brushes. The Westinghouse multipolar generators and motors of 100 and 150 k. w., 125 volts, and the 150, 200 and 250 k. w., 250 volts, which have all the brushes of the same polarity maintained at the same potential. These five sizes on account of their large capacity, have parallel wound armatures, whereas series winding is used on the armature of smaller machines.

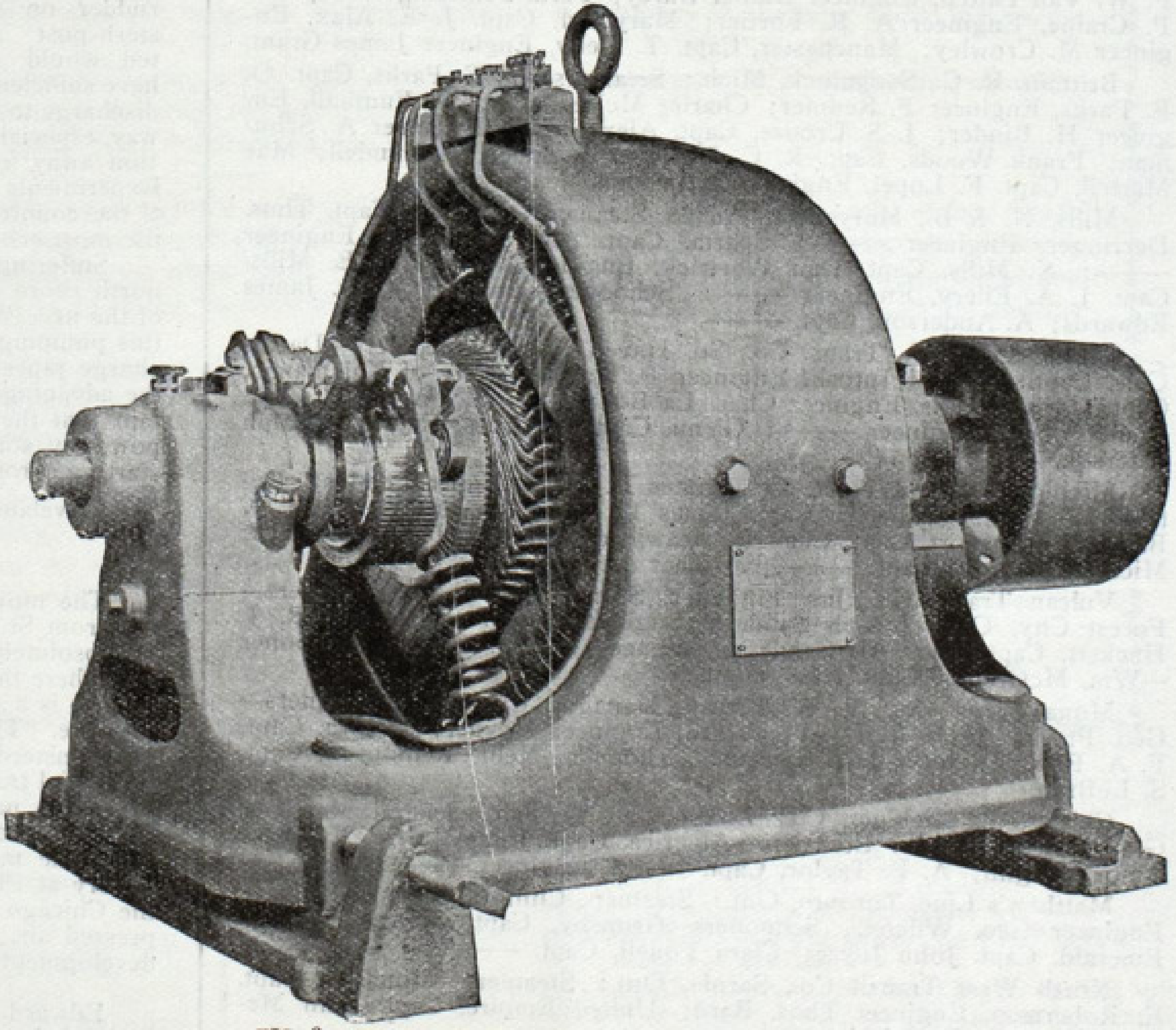


FIG. 3. WESTINGHOUSE 500 VOLT MULTIPOLAR MOTOR.

The difficulty of securing the same magnetic strength in all the poles with parallel-wound armatures is obviated by the following method of balancing: A number of points in the armature winding, which are normally of equal potential, are connected together by leads, through which currents may pass from one section to the others with which it is connected in parallel. These currents are alternating in character and lead or lag with reference to their respective e. m. f.'s, and thus magnetize or demagnetize the field magnets so as to automatically produce the necessary balance between them. This method of balancing is also of great advantage in eliminating the sparking at the brushes and other wasteful heating, which occurs when an armature becomes decentralized, due to wear of the bearings or from other causes. When, on account of the armature being out of center, the air gap on one side is greater than that on the opposite side, the potential generated in the coils on the side having the smaller air gap is considerably higher than that generated in the coils under poles of the same polarity on the opposite side; consequently, a current corresponding to this difference of potential flows from one section of the winding to another through the brushes and connecting leads.

By the use of this balancing method, the armature could be considerably out of center and no injurious results occur, as the balancing currents do not flow through the brushes, but through the specially provided connections, as explained above. In addition to this, the fact that the currents in these conductors are alternating currents, which are "leading" in some coils and "lagging" in other coils, enables a very small current to effectually balance the circuits. Should the armature get out of center by wear of the bearings, this method of balancing the magnetic circuits is specially advantageous in preventing any heavy magnetic pull on one side of the armature. The pull which may be excited by one side of the field on a large armature, even if out of center by a small fraction of an inch, may become several tons unless this method of balancing is used, but by this method of balancing, the induction under all poles is maintained practically the same, causing the magnetic pull to be equal at all poles and preventing an unbalanced pull.

LIFE-SAVING APPLIANCES.

In a letter to the American Shipbuilder of New York, James Richardson scores the steamboat inspection service for loss of life that has occurred of late on several wooden barges along the Atlantic coast, due mainly to the lack of proper life boats or other life-saving appliances on these old vessels—worn-out hulls that are towed in the coal trade. The correspondent intimates that if the heads of the vessel inspection branch of the treasury department are not backed up by laws pertaining to such vessels it should be their duty to bring about the necessary regulations and also seek changes in laws already on the statute books which are said to be worse than useless. The communication is in part as follows:

"There are many instances where lives were lost on vessels of this kind that might have been saved if suitable life-saving appliances were to be had. The style of davit for launching ships' boats is not mentioned in the statutes, nor in the regulations governing the equipment of steam vessels. Whether this is a matter that is left to the discretion of the board of supervising inspectors of steam vessels, I know not. If it is, it is certain that sufficient care has not been given to the subject, which is a most important one, and cannot be remedied any too soon. The style of davit most used today, and with which all old steamers are equipped, and many of the new ones recently built and now building, is so constructed that in order to swing the boat outboard, it is necessary to turn first one crane and then the other, after slacking up the guys. To stay the cranes after the boat is swung out, the guys must be tautened up again. This often causes delay and confusion at a most critical time and results in serious loss of life, which could be avoided by the use of the style known as the Malony davit, the patent of which I am of the opinion has expired. With this style the boat rests in the chocks outside of the cranes. To swing the boat clear of the side, the cranes are pitched forward and are stayed by the slots through which they pass, thus avoiding the delay and confusion that attends the process of lowering a boat with the old-fashioned style of davit. It would seem that the selection of the style of davit is left entirely to the designer of the vessel, whose knowledge and experience in the use of and the necessity for the proper means with which to swing ships' boats is generally rather limited. Such important matters should be decided by those who from experience have a better knowledge of the need and use of such appliances.

"When statute 4488 was enacted the best detaching apparatus known at that time is described and embodied in the statute as follows: 'Shall have the life boats required by law provided with suitable boat disengaging apparatus so arranged as to allow such boats to be safely launched while such vessels are under speed or otherwise, and so as to allow such disengaging apparatus to be operated by one person, disengaging both ends of the boat simultaneously from the tackles by which it may be lowered to the water.' Since the enactment of this law other devices better adapted and more reliable have been invented. The board of supervising inspectors claim the wording of the statute prohibits them from adopting any other good device, no matter whether it is better or not, and that they cannot approve or enforce the use of any other. If this is the case, which is doubtful, the quicker statute 4488 is amended the better it will be for the public who travel by water. Repeal this worthless feature of the statute and the heart-rending accounts caused by the inability to lower and detach the boats in time of disaster will be of less frequent occurrence. If the laws governing these matters are such as do not admit of enforcement, then change them so that they may be enforced, and if those whose duty it is to enforce the laws fail to suggest and seek necessary changes, they should be censured and held accountable to the proper authority. If they are incompetent in this regard, competent men should be appointed. They should be men who by practical experience are able to determine what is best and then act without fear or favor. They should be up to date men, familiar with all appliances for modern steamers and independent of all political influences."

Mr. Winfield Davidson, civil and mechanical engineer of Rockville Centre, L. I., says in a letter to Messrs. Cole & Kuhls of Brooklyn, N. Y.: "Your seam paint and elastic seam composition is all you claim for it. I used it in overhauling my launch and a season's test proves it greatly superior to putty. I used it in two particularly bad seams, in which I had in vain tried to make putty stay, and on examination found that it had not the least sign of cracking or falling out. On either old or new work I shall certainly use it in the future, and have no hesitation in recommending it to any one."

DEARING WATER TUBE BOILER.

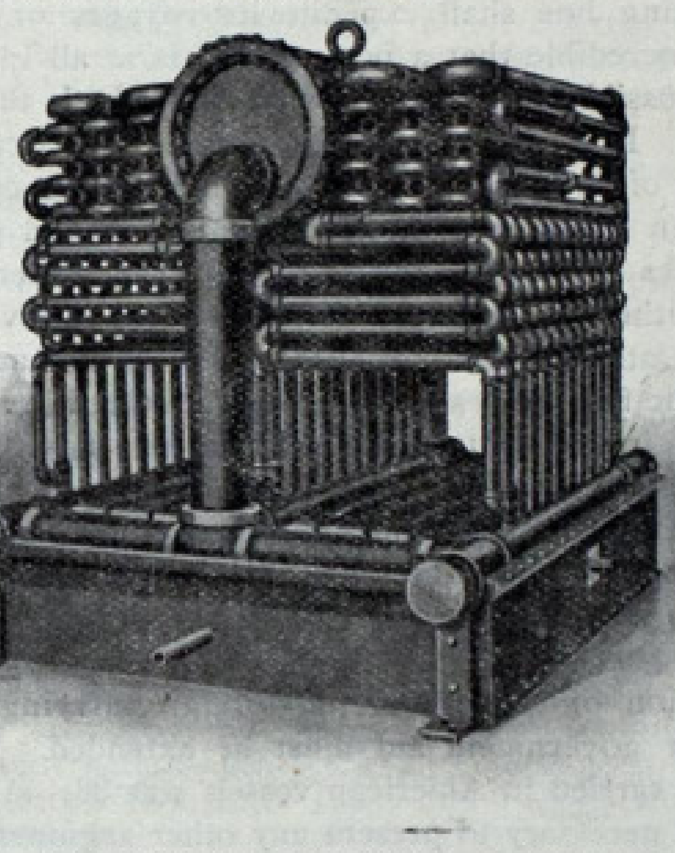
For seven years past the Dearing water tube boiler has been in use in different parts of the country, largely on steam vessels of the great lakes, but the manufacturers have not tried to push it into favor. They have been concerned with its practical development, but now that their efforts on that score have resulted in an unbroken list of satisfied customers they have prepared for the construction of the boiler on a very large scale. A small book dealing with this boiler, which has just been issued from the office of the company—Dearing Water Tube Boiler Co., Detroit, Mich.—is a model of neatness and clearness, both as regards the illustrations and the descriptive matter. Construction of this boiler, the manufacturers say, has been made to conform with important requirements, and on this score they make the following claims:

"First—A perfect circulation in all its parts; no conflicting currents, as all passageways through the boiler are so designed that the circulation is continuous and uninterruptedly in one direction. The importance of perfect circulation in the water tube boiler cannot be over-estimated. We have seen water tube boilers operated at a moderate rate of duty give fairly good results, but the moment they were crowded a little, the circulation was found to be insufficient to prevent the tubes most exposed to the fire from overheating. When such overheating occurs, the life of the tube must be short, and the common result is the bursting of the tube, with the consequent delay and trouble in making repairs.

"Second—The use of such materials as practical use has shown to be the most suitable for the duty required.

"Third—Settling chambers, in which the action of the water in circulating deposits the impurities of the water in such a way that such impurities may be readily removed by the use of a blow-off pipe.

"Fourth—The proportioning of heating surface so as to get the best results obtainable, and the placing of heating surfaces practically at right angles to the travel of the heat rising from the grates, by which arrangement the currents of heat are broken up and distributed through the generating tubes in such a way as to thoroughly absorb the heat into the water and thus secure great fuel economy.



DEARING WATER TUBE BOILER, BACK VIEW.

"Fifth—Steam dome properly proportioned, giving ample capacity for steam room, and sufficient water surface to allow the rising steam to easily separate from the water, thus giving the boiler a steady steaming capacity and a steady reliable water level, preventing priming, and in connection with a system of baffle-plates, dry pipes and super-heating surface, insuring perfectly dry super-heated steam.

"Sixth—A construction so much stronger than the actual requirements that the danger of rupture of any of the parts is practically done away with, and at the same time so arranged that if a rupture should occur it would be confined to such a small part or section that it could not produce an explosion and could be readily replaced.

"Seventh—A construction which, in the event of repairs being needed, does not require the use of special tools, expert workmen, or material not easily obtained."

A back view of the boiler is presented herewith. On page 24 a front view is shown in the company's advertisement. The boiler consists of a cylindrical steam drum or separating chamber, connected at each end to the tubular base or water leg by vertical pipes of ample area, which together form the frame of the boiler. The generating tubes are placed at a sufficient height above the grates to form the furnace or combustion chamber, and each section forms an unobstructed passage between the base pipes and the steam drum. The grates are placed at the level of base pipes. The economizer or feed water heater and the super-heating tubes are placed above the generating tubes so as to intercept the heat rising from the furnace, which heat would otherwise be wasted by passing into the chimney or smoke pipe. The whole boiler is preferably encased in masonry for stationary work, and in a suitable asbestos lined metal case for marine use or where the boiler it intended to be portable.

The North German Lloyd liner Kaiserin Maria Theresa, which arrived in New York a few days ago, was formerly known as the Spree. She was in the hands of the ship builders for many months and has been practically rebuilt. She has been changed from a single-screw 18½-knot boat to a twin-screw craft, with triple expansion engines, capable of developing a speed of 21 knots. Her length has also been increased 70 feet, and her beam to correspond.

The Hamburg-American line is now engaged in the construction of twenty-two new steamships. The total cost of these vessels will be about $11,000,000, and they will add 150,000 tons to the tonnage of the company, which at the end of last year was 418,812 tons, represented by seventy-six vessels. Nearly all of the vessels will have twin screws. Some of them are to run between Hamburg and Philadelphia and Baltimore.

MARINE REVIEW

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It would be difficult to put one's finger upon a measure more grievously maligned or more cunningly lied about than the shipping bill. The syndicate for the dissemination of misinformation regarding this measure knows no limit, either to its industry or its imagination. The country is simply flooded with misinformation. A bulletin which circulates most freely puts the question in this startling manner: "The question before congress is whether it shall enter upon a course that will cost the country anywhere from $300,000,000 to no one knows what." The utmost limit of expenditure under the bill is $9,000,000 per year for twenty years, and the payment for the first year, which, of course, must be to vessels already in existence cannot possibly exceed by $2,600,000 the sum already annually expended for carrying the foreign mails.

The article continues: "In return for this expenditure the United States will receive no service which it is not now receiving without it. It is not stipulated that a single new steamship line shall be established or that an existing line shall expedite its voyages or increase its efficiency." It is incredible that a person who is at all informed upon the measure could possibly write such drivel. Why that's the very thing that the bill does do. It expressly provides that no American vessel can receive one penny of compensation until at least 25 per cent. of additional tonnage has been constructed in American yards and put in operation. It further provides that no foreign ship, owned by American citizens and coming in under the provisions of this act can ever receive more than one-half the compensation paid to American vessels and not one cent until the tonnage of the foreign vessel has been duplicated in an American ship yard. A report from the treasury department shows that, taking the vessels now in existence which may receive the compensation under the bill, there would be an additional expenditure for the first year of $2,600,000 conditioned on the subsequent building of about 400,000 tons of new shipping in American yards and at an expenditure of labor and material of over $40,000,000.

If construction of vessels for the foreign carrying trade is not to perish altogether government aid must be extended. In 1869 the percentage of trade carried in American vessels was 33; in 1899 it was only 8 per cent. Is it necessary to present any other argument than this?

The navy board of construction and repair has decided to proceed at once with the preparation of plans for the three first-class battleships and three large armored cruisers authorized by the last congress. The only thing which has delayed the board in formulating the plans hitherto has been the vexed question of armor plate. Tentative plans have been nearly completed for the battleships and rapid progress has been made toward finishing those for the cruisers. Sufficient data are already available to enable the department to issue a circular letter to ship builders within the next two or three weeks outlining the features of the ships. This letter will be sent to the builders who in the opinion of the department may enter the competition for constructing the ships to afford them opportunity to prepare separate designs, based, however, on the general requirements laid down in the circular. There will be no vital change in the design of the battleships from that laid down some time ago, except possibly in the question of turrets which may be subjected to alteration if the coming sea trial of the Kearsarge proves the superiority of the superimposed turrets over the present type.

The battleships will be of about 13,500 tons displacement with a speed of not less than 18 knots and with twin screws and triple expansion engines. The main battery will be four twelves, two in each turret fore and aft; four eights and fourteen sixes, the last named of the most improved rapid-fire type. A suggestion was advanced of doing away with all eights and substituting sixes, but it was decided to have four eights in two turrets to be located just abaft the fore turret and far enough removed to escape the blasts of the twelves. The question of placing these 8-inch turrets, en echelon, as those of the Maine and Texas are arranged, caused some discussion, but it was shown to the board's satisfaction that the present plan was more feasible and certainly admitted of a greater arc of fire from forward to abaft the beam. It is estimated that this will not be less than 60 degrees from forward to aft.

The general outline of the armored cruisers provides for vessels of 14,500 tons, about 22 knots speed, and with a battery comprising four 8-inch guns in two turrets and a large number of sixes in broadside fire. Further details of these vessels will be worked out before the circular is issued.

The announcement that the North German Lloyd company is to emulate an example which has obtained in Great Britain for some time of establishing a training ship for cadets will be hailed with a great deal of pleasure. Some such means as this must be employed if competent seamen are to be kept constantly upon the seas. In these days of specialization it is very possible that a ship's crew, taken individually, may have scant knowledge of practical sailing. Steam has relegated to the rear the old time sailor and the only recourse for the apprentice who desires to be a thorough seaman nowadays is the training ship. This condition is well recognized by the navies and it is a helpful sign that the great steamship lines are turning their attention to it also. In doing so they become in every sense of the word public benefactors, for the training must be considered as wholly a matter of expense and not of profit. It is understood that the company intends to procure a large sailing ship, which is to trade to all parts of the world—not primarily to make money but to train young Germans for a maritime career. The cadets are to serve the first year as ship's boys, the second year as ordinary seamen and the third year as A. B's. The cadets must be of standard education before they are taken into the service. The technical education will therefore be based upon a disciplined mind. The teaching will be under the supervision of the Bremen school of navigation and a tuition fee of £30 per annum will be charged.

The naval force at Dry Tortugas has been recalled and it would seem as though the treasury department had scored a victory over the navy. The request of Surgeon-General Wyman has been met and the place will be used as a quarantine station from April 1 to Nov. 1 by the marine hospital service. The contracts for naval work will be extended for a period of seven months. The navy department is extremely anxious to obtain possession of Dry Tortugas all the year around and will present the matter to the secretary of the treasury, though, paradoxical as it may seem, every naval officer dreads the assignment to Dry Tortugas. It is a most lonely spot and one may walk around the island in forty-five minutes.

The naval appropriation bill, when it is presented to congress, will contain the largest appropriation ever asked since the United States became a nation. This is the logic of events. The United States has become a naval power and must provide generously for the future. It is to be hoped that congress will forthwith allow the appropriation and program upon which the committee on naval affairs has spent so much time. The program of two battleships and six cruisers is a modest one, but is sufficient for the year. The battleships Kearsarge, Kentucky and Alabama are yet to be commissioned, the Illinois and Wisconsin to be launched, the Maine, Missouri and Ohio to be completed, and the Georgia, New Jersey and Pennsylvania to be begun.

Syren and Shipping of England contains the following note: "The Engineering Magazine is no doubt a very fine journal of its class, but in its March number it becomes Jove-like and nods. Thus we read in an article on the world's shipping the astounding statement that 'while the twin screw has become more general it should be noted that in two new steamers of the Castle (Cape) line—Kinfauns Castle and Kildonan Castle, built on the Clyde—the single screw was reverted to.' Where does our contemporary secure its facts?"

The Engineering Magazine might ask where does Syren and Shipping derive its simile. 'Tis Homer nods.

The sad experience which the government has had with all of its timber docks seems about to be repeated at Port Royal. The auxiliary cruiser Caesar has just been docked there, but it is understood that the structure is in a very dilapidated condition and that the time is not far distant when it will have to be completely rebuilt. The government has learned wisdom through experience and it will doubtless replace the structure with a substantial masonry dock.

TRIAL TRIPS OF BATTLESHIPS.

The final sea trial of the battleship Kearsarge will be made on April 3. Secretary Long has designated the following naval officers to conduct the sea trial: Rear Admiral Frederick Rogers, Capt. Robley D. Evans, Commander Joseph Hemphill, Commander Charles E. Roelker, Lt. Com. Richard Henderson, Naval Constructor Washington Capps. The big ship will be kept at sea for forty-eight hours and will be thoroughly tested. Unusual interest attaches to the trial, for the superimposed turrets will be tested at the time. The vessel will be put to her maximum speed and all her guns will be fired, including those in the superimposed turrets. Upon the showing will depend the introduction of the turrets on the new battleships for which plans are now being formulated. Rear Admiral Bradford has made an enthusiastic report upon the appearance of the new turrets, but Rear Admiral Hichborn doubts their wisdom from the practical standpoint.

Within a week the battleship Wisconsin, now almost completed by the Union Iron Works, San Francisco, will go out on a series of trial trips. The vessel's machinery has long been completed, and it has been given several tests. It is expected that she will be fully up to the standard of the battleship Oregon.

ALONG THE ATLANTIC COAST.

NEW SHIP BUILDING AND DRY DOCK PROSPECTS—WONDERFUL ACTIVITY APPARENT IN ALL THE YARDS—PLANS FOR ANOTHER WORKS AT RICHMOND.

Ship building and repairing along the upper Hudson is active. William H. Baldwin, at his New Baltimore ship yard, has a tugboat hull under way for Capt. W. Smith. She will have a 14½x16-inch high-pressure engine with a boiler of 6x11 feet, allowed 140 pounds of steam. She will swing a Chubb wheel, which is now being made at the Skinner & Arnold foundry, Albany. At Mr. Baldwin's yard two of the Troy Line barges are being rebuilt. The steam yacht May Wright, owned by Wright Bros. of West Albany, is being rebuilt at Mouse Hollow. The People's Line coal barge Cogswell is being rebuilt from the waterline up, on the bank in the lower basin. Capt. George Cooley is rebuilding and lengthening his tugboat Thomas Miller at the Sloop dock. At the Hudson river dry dock, in Albany, Paul LeRoux has rebuilt the propeller ferryboat Chester G. Ham of the Smith & Taylor Line, which was burned last fall. Skinner & Arnold have furnished her with a new boiler. The cabins will be finished in oak. At the LeRoux yard a new tug of 50 feet length for Captain Davis is nearly finished. At this same yard the keel is being laid for a tug for Myers Henderer, for service in New York harbor. She will be 68 feet long, 17 feet beam and 6 feet 10 inches depth of hold. Her engine will be 14½x16 inches, high pressure. The boiler will be 6x10 feet, allowed 140 pounds, and a Chubb towing wheel will be provided. Besides the three boats building at this ship yard there are six Troy Line barges and several North River lumber boats there for repairs.

In spite of the many changes in the heads of the departments at the Bath Iron Works everything moves along in the accustomed way and one not acquainted with the plant would never suspect that any changes had occurred. The two steel tugs for the New York, New Haven & Hartford Ry. are at the company's wharves fast nearing completion. The next launching at the works will be that of the monitor Connecticut, which will go overboard either late in April or early in May. She is 225 feet long, 50 feet wide, 12.6 feet deep, displacement 2,700 tons, twin screws, indicated horse power 2,000. Her speed is to be 12 knots and her coal bunker capacity will be 200 tons.

The Fulton Engineering & Ship Building Works at San Francisco, Cal., has just completed two of the greatest curios in marine architecture ever seen on the bay of San Francisco. They are stern-wheel launches, each of which is 35 feet long, 12 feet beam and 24 inches depth of hold. Loaded they only draw 6 inches of water, and under trial have made seven knots an hour. The engines are marvels of lightness, compactness and strength. The two boats are intended for the Amoor River (Siberia) trade. They have been built to the order of a Russian firm and will be taken to Vladivostock on the tramp steamer Leander.

C. C. Hanley & Co. of Quincy Point, Mass., will have completed in the fall a set of marine railways that will be capable of hauling 500 tons. They now have a storage basin of 500 by 800 feet. There is 42 feet of water at low tide just off this basin and there will be a draught of 15 ft. in it by fall. Hanley & Co. expect to haul out, store over winter and repair all classes of steam yachts. They will also keep on building the class of racing yachts that has made the name Hanley so well known to yachtsmen.

The New York Central Railroad Co. has recently contracted with T. S. Marvel & Co., New York, for two powerful steel tugs, each to be 105 feet long. The Burlee dry dock, at Port Richmond, S. I., have also been given a contract by the New York Central to rebuild their tug C. C. Clark and are building, besides, a large freight propeller for this corporation to be 110 feet long and 30 feet beam. These boats are to be fitted with all modern improvements, including electric lights, steam steering gear, etc.

Last week the new tug Wm. J. Bradley was launched at Camden for the American Dredging Co., and is 85 feet long, 19½ feet beam and 10 feet deep. The new tug Gerry, built by Jackson & Sharp, with engines by Neafie & Levy, for the National Dredging Co., Mobile, is 110 feet long, 24 feet beam and 10½ feet deep. She has had very successful trials lately. Repairs by Cramps to the Hamburg-American liner Brisgravia will, it is said, cost about $25,000.

Messrs. Chamblin & Scott of the Richmond Iron Works, Richmond, Va., are considering the question of undertaking the construction of ships. If they engage in the business their principal need will be tools for hull work. They would be glad to receive catalogues from manufacturers of tools and other appliances for the ship building indust but say that at present it would be a waste of time for salesmen to call.

The advent of the New York Ship Building Co. is responsible for a big building boom in Camden, N. J. When it was decided to locate the mammoth ship building plant in the lower section of the city the work of preparing homes for the prospective workmen was begun. The new plant will employ from 2,500 to 5,000 men and it is estimated that 2,000 houses will be built in the vicinity of the new ship yard.

The Harlan & Hollingsworth Co., Wilmington, Del., has notified the navy department that the torpedo boat Stringham, built by it, had a satisfactory private trial a week ago and will be ready for her official trial on the 31st instant. The boat is to be run over a course in Chesapeake bay. She is required to make not less than 30 knots an hour. The naval board has been requested to conduct the trial.

The William R. Trigg Co., Richmond, Va., will shortly begin work on the new dry dock which is to be situated on Justis island. Ways will also be erected upon the island upon which the cruiser Galveston is to be built. When all the improvements are completed and the new machinery put in the works this company will have three times their present capacity.

The new dry dock of the Morse Iron Works & Dry Dock Co., foot of 55th street, Brooklyn, is of the following dimensions: Length 88 feet; breadth 120 feet; draught 15 feet; capacity 17,500 tons. This dock will be a floating dry dock and upon its completion the company will at once begin building an additional dry dock with a capacity of about 3,5

A carload of locust trenails from Port Royal, Va., has reached Bucksport and another car with large steel plates from Pennsylvania has also arrived, to be used in the construction of vessels now building in the McKay & Dix yard. Frames of the second and third vessels of nearly 1,200 tons will be shipped from Parrsboro, N. S., the first week in April.

The triple expansion engines which are being built for the torpedo boats Nicholson and O'Brien by Alfred Box & Co. of Philadelphia are almost completed. This firm is also supplying the ammunition trolleys for the battleship Wisconsin at the Union Iron Works, San Francisco, and the Russian cruiser Vareag at Cramps.

The steamship business carried on by the New York & Cuba Mail Steamship Co., commonly known as the Ward Line, has been turned over to a new concern, James E. Ward & Co. of New York City. The latter is a reorganization into a joint stock company of all the steamship lines heretofore operated by Mr. Ward.

The steel steam yacht Kanawha, John P. Duncan, was lowered from Brown's dry dock, Jersey City, a few days ago, when she proceeded to Morris Heights, where she will be overhauled and refitted, preparatory to being placed in commission for the season. Capt. Wm. A. Miller is in charge.

Assignee J. Warren Coulston announces that the plant of the Charles Hillman Ship & Engine Building Co., Philadelphia, had been sold at private sale to the Wm. Cramp & Sons Co. at a price that was satisfactory to the creditors and the assignee alike.

Washburn Bros., Thomaston, Me., Saturday launched the schooner John E. Devlin, which will engage in trade between Philadelphia and the West Indies. The Devlin registers 1,107 tons gross and will be commanded by Capt. E. L. Hichborn.

The Sumner Iron Works of Everett, Wash., has secured a contract from E. B. Scott to build a passenger steamer 160 feet in length, 25 feet beam and 7 feet depth of hold. The steamer will be put on the route between Seattle and Tacoma.

Moran Bros. Co., Seattle, Wash., have under construction a floating dry dock of the following description: Length 400 feet; 60 feet between towers; displacement 12,000 tons. The dock will have patent steel wedg keel blocks.

The four-masted schooner Malcolm Baxter was launched in H. Bean's yard at Camden, Me., on Tuesday of this week. She is owned by Capt. George Bailey of Manasguan, N. J.

The bid of Moran Bros. Co., Seattle, Wash., for repairs to the hull, boilers and machinery of the light-house tender Columbine has been accepted. The bid was $11,780.

The Wolff & Zwicker Iron Works of Portland, Ore., expect in the very near future to have a floating dock under construction. At present they have no dry dock.

The Pennsylvania railroad is preparing an immense plan for a line of piers and docks which will stretch from the New Jersey ferry at Communipaw to Greenville.

AT THE UNION IRON WORKS.

A report from San Francisco is to the effect that these are very busy times at the Union Iron Works. There are in all six naval vessels in various stages of construction—the battleships Wisconsin and Ohio, the torpedo-boat destroyers Perry, Paul Jones and Preble, and the monitor Wyoming. There has been delay on all the vessels owing to the lack of material. The Wisconsin, of course, is the nearest to completion, and work on her is being rushed as fast as possible without that part of the armor which has not yet been furnished by the government. This is the turret armor. The barbettes have been completed and the gun carriages placed in them for the big 13-inch rifles. Three of the latter are at the works, but they cannot be mounted for the reason that the electric motors needed for them are not yet on hand.

The turrets of the Wisconsin differ from those of the battleships of earlier date. They are the Hichborn balance type of turret, and are of elliptical shape. They turn with greater ease and freedom and present to the enemy an inclined surface to fire at. The turret overhangs the barbette and balances nicely the long barrels of the big guns. The Ohio is built up to her protective deck, which means that 40 per cent of her hull has been completed. Besides her bilge keels to steady her, the Ohio has two docking keels. These are toward the stern and are to steady the vessel and lessen the chances of damage when she goes on the dry dock. All the warships are now having these keels put on.

In the torpedo-boat destroyers there are a number of changes from the model of the fleet Farragut. For one thing, the bottoms over the propellers are arched instead of being flat. The destroyers are equipped with balance rudders, which makes the work on the steering gear much easier and permits more rapid handling of the craft. The maximum speed for these destroyers is 29 knots. They will have two engines, four boilers and four smokestacks. The horsepower will be 8,000.

Besides the fleet of warships at the Union works, the big freight steamer California and the ferry steamer San Pablo, the latter for the Santa Fe Co., are also on the stocks.

LUNDELL FANS FOR COL. PAINE'S YACHT.

The Sprague Electric Co. has recently received an order for two 18-inch Lundell fans for use on board the steam yacht Aphrodite, belonging to Col. Oliver H. Paine, and which is preparing for a trip around the world. These fans are arranged to ventilate the engine room by the plenum vacuum system of ventilation. In addition to these are some seventeen Lundell fans of the bracket pattern located in the cabin, staterooms and smoking room. They are finished to correspond with the interior decorations of the yacht.

It is announced from Washington that the treasury department will again advertise for bids on the revenue cutter of 176 feet length that is to be constructed for the great lakes. Townsend & Downey, New York ship builders, were the lowest bidders for this work, but it is claimed by Capt. Shoemaker of the revenue cutter service that they could not get their works in readiness to deliver the vessel within the time required. The new cutter will probably be named Mackinaw.

MANZEL AUTOMATIC OIL PUMP.

The accompanying illustrations show a recently improved form of oil feed pump which offers some advantages not possessed by others now in the market. The pump is constructed of brass, finished and nickel plated all over. The reservoirs and sight feeds are of glass and the adjustment of feed is done by screws at the top of the reservoir, without uncovering or interfering with the oil supply. One strong feature of this pump is the variable feeding of oil and the independently adjusted flow of oil from the reservoir on the larger sizes of pump.

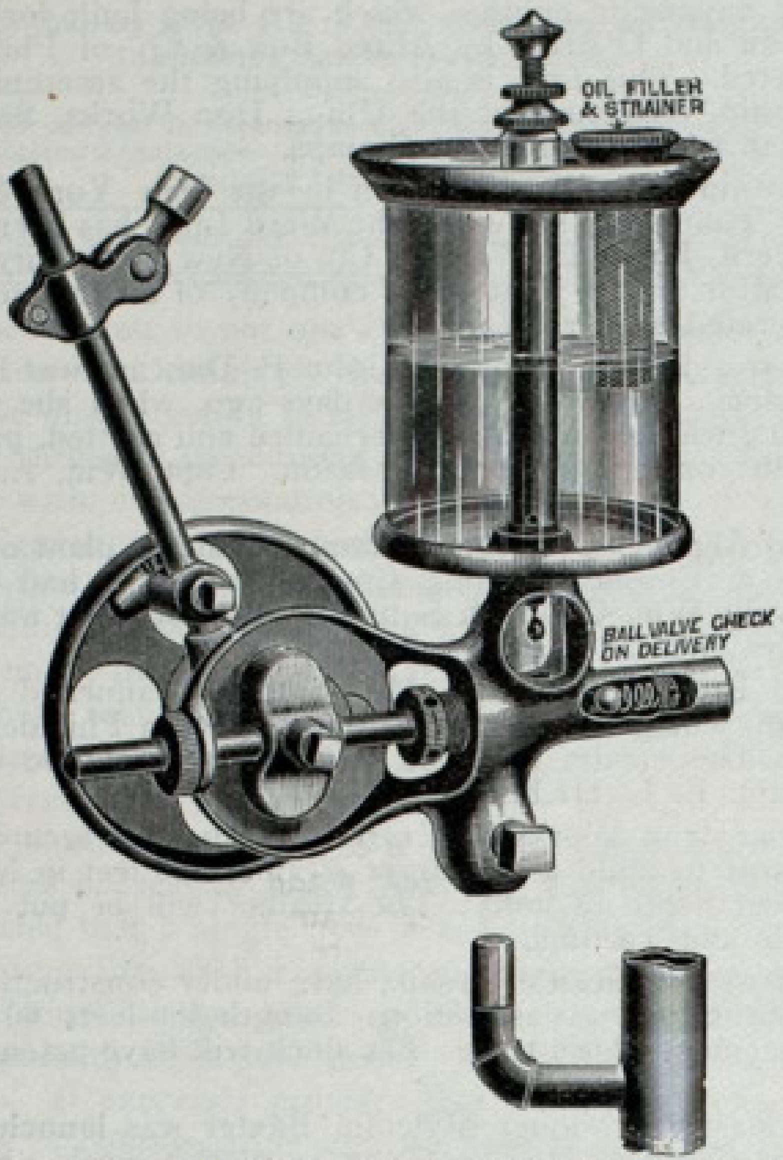


FIG. 1. SINGLE FEED MANZEL OIL PUMP.

We show a single and also a triple feed among the illustrations. In this triple feed it will be seen that there are three separate pumps connected to the reservoir and having all the plungers yoked to be operated by one ratchet. This furnishes a varying or uniform supply of oil as desired, independently of the stroke of the plungers, which is also adjustable, as will be readily understood from the illustration. The sight feed forms an important improvement in this class of machinery, as it insures instant detection should the reservoir become clogged from dirty or gummy oil. The pump cylinder is closed by a ball check valve, held in place by a spring, as shown in the engraving of the single pump.

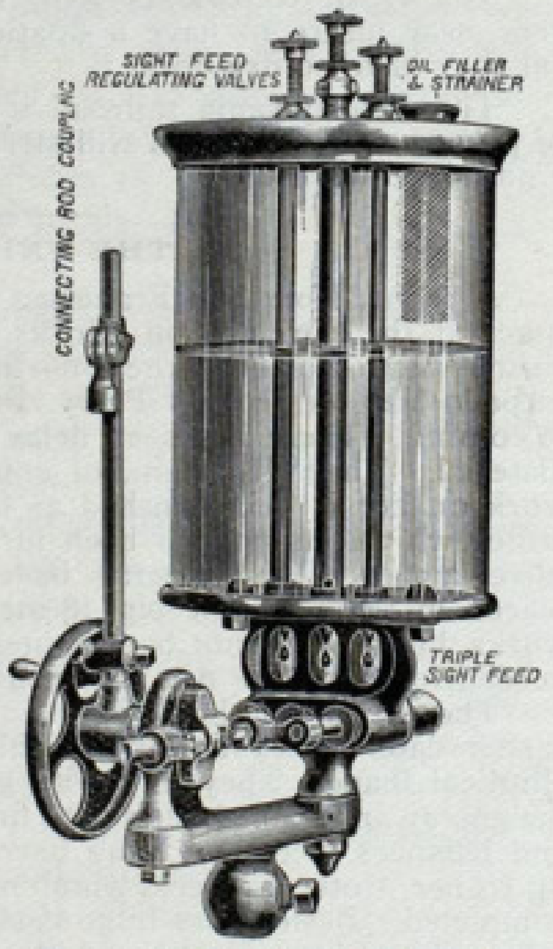


FIG. 2. TRIPLE FEED MANZEL OIL PUMP.

The reciprocating motion is changed to rotary by a ball clutch which is shown in Figs. 3 and 4. Fig. 3 shows an annular groove on the inside of the periphery of the wheel and a similar groove on the corresponding face of the clutch piece, carried on the oscillating arm, with the ball held in place by a spring. Fig. 4 shows the brake, which is the same construction, reversed and applied to the hub of the driving wheel. Therefore the brake holds the wheel while the clutch takes a new grip. All balls are steel and amply large to allow for any wear.

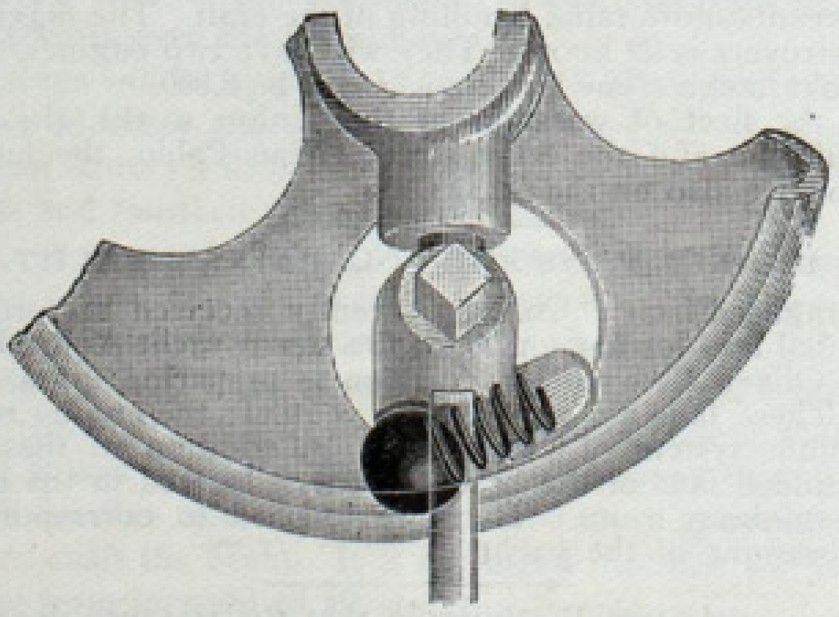


FIG. 3. BALL CLUTCH MANZEL OIL PUMP.

These pumps are made in sizes from one pint to two gallons capacity. They are in use on the steamer Geo. Spencer, on the Hingston & Woods dredge Pan American, on vessels of the Tonawanda Iron & Steel Co., at the Carnegie Steel Works, Pittsburg, and also by the Deering Harvester Co. of Chicago, Cummings Cement Co. of Akron, W. J. Rainey of Mt. Braddock, Pa., Buffalo News, Snow Steam Pump Works and many others. In all cases they are giving satisfaction.

A descriptive circular issued by the manufacturers, Manzel Bros., No. 87 Van Rensselaer street, Buffalo, says: "As our modern engines and pumps require perfect cylinder lubrication to enable them to reach their highest efficiency, this lubricating oil pump has been especially designed to meet the demand for more reliable and economical lubrication of steam engines and pumps of every description. It is noiseless in operation; it has no equal on high speed engines; sight feed is free from steam and water; it will feed any kind of oil or graphite; variations of temperatures do not effect its operation; it will save from 30 to 60 per cent. of oil."

The Tonawanda Iron & Steel Co. of North Tonawanda, N. Y., reports in a letter to Manzel Bros.: "Our superintendent, Mr. Kerr, says that your pumps give the best satisfaction of any pumps he has ever used."

Schoellkopf, Hartford & Hanna Co. say: "We have two of your cylinder oil pumps in practical use and both appear to be giving excellent satisfaction. We shall order more of these as our needs may require them." Peter Eckam, chief engineer of the Buffalo Brewing Co., also recommends this pump very highly. He says: "I have been using one of your automatic oil pumps on a high-speed engine for some time. I can recommend them as the best that are made. In the saving of oil they have no equal. The sight feed is very desirable."

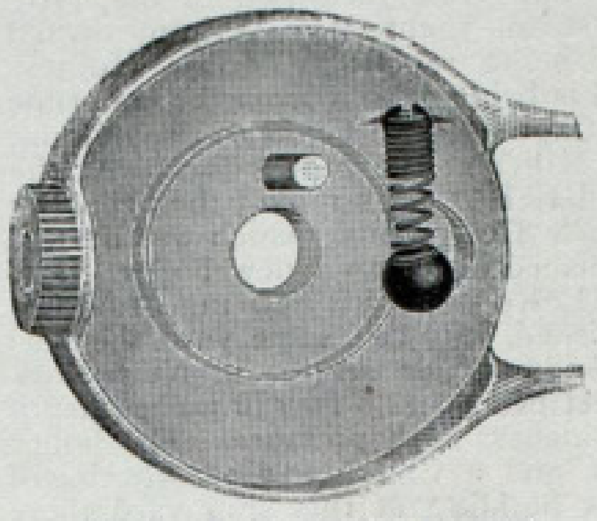


FIG. 4. BALL BRAKE MANZEL OIL PUMP.

All pumps have a hand attachment on driving wheel; may be used before starting engine, or if more oil is needed momentarily. It does not disturb adjustment.

"RIVER NAVIGATION."

The Review has received from the Marine Iron Works, Station A, Chicago, a pamphlet bearing the above heading and designed to furnish information to those who, without previous experience, are thinking of purchasing or building and operating river steamers on shallow and swift streams. It reviews in a general way the necessary qualities of design and construction that must be considered in suiting the boat to the conditions required of it, and some of it is so pertinent that we quote the following:

"The facts are that designs and plans of construction of the hulls and equipment of these boats may fairly differ from each other quite materially, although each may be best in its particular type for certain waters and conditions. Unfortunately, however, it too often occurs that some one successful boat is adopted as a pattern where the work and conditions of service are radically different from that which the original boat is performing successfully. Suppose a small steamboat is required for a river, which is not only very shallow, but also has a rapid current, crooked channel, and boat required to make sharp and quick turns in its regular duty as a fast passenger boat. Suppose, also, that the same size of boat is wanted for another river which, however, has a fairly straight, clear channel, moderate current, and boat must do some towing. The two boats, as far as design or 'modeling' of hull and equipment is concerned, should be entirely different to secure the best results sought for in each case, and each of the two prove a source of satisfaction and profit to their owners, whereas if their positions were reversed they would both fall short of a satisfactory showing to a degree difficult for the owners to understand.

"Manifestly a 'cure-all plan' of design, construction and equipment which might now and then accidently hit the mark, would be very likely to miss it nine times out of ten, and is our reason for emphasizing the well-tested fact that in every case, without exception in river navigation, the boat must be designed, built and fitted out to meet the exact and ofttimes peculiar requirements of each particular case in order to be successful.

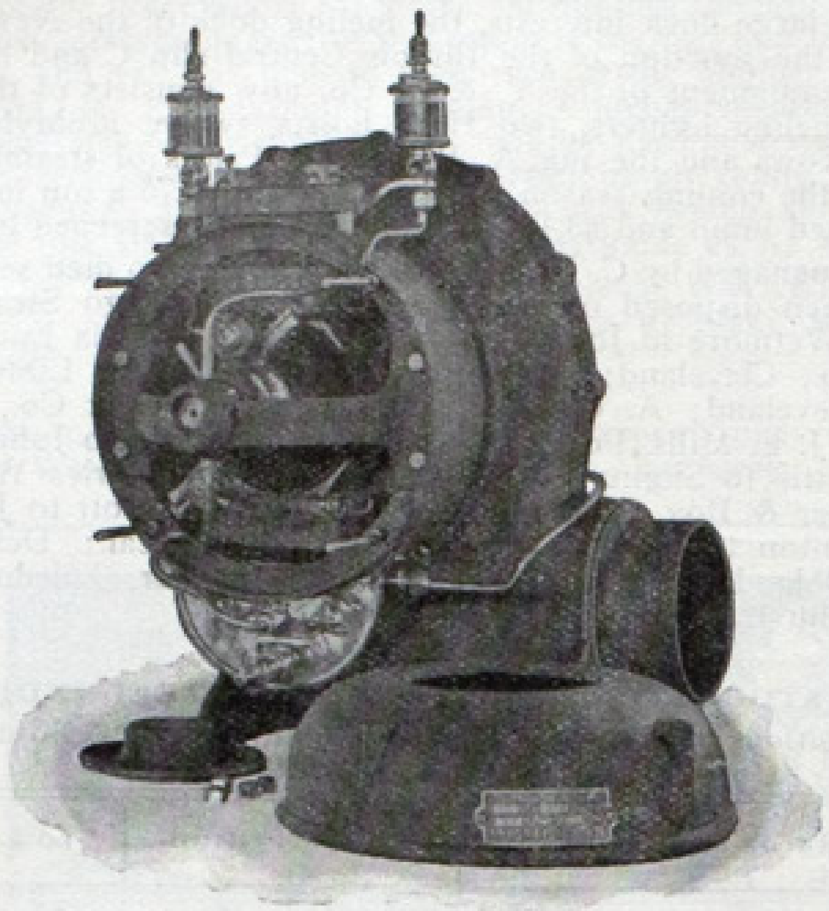
"It is the completeness and correct combination of the machinery and et ceteras that go a long way toward making a successful steamboat. We have found it necessary to design and make most of the accessories and deck equipment for our outfits of driving machinery or boats, in order that each article, fitting, etc., would fit the case and prove suitable for the most severe work or strain that it may fairly be called upon to perform. In comparing estimates of costs and quotations, do not underestimate the value of completeness as well also the character of work, having in mind the fact that the difference in price can only be saved once."

The pamphlet gives full details as how to order a boat for special purposes and explains the company's plan of building boats and shipping them "knocked down" to save freight and allow of easy transportation away from railroads, etc. It also explains how they build machinery only and furnish plans for building the boats on the waters on which they are to operate. The company has been very successful in this work and many of its boats are now in successful operation in Mexico, the South American republics, the Congo country in Africa and many of the western lakes and rivers of America. Copies of "River Navigation" will be mailed free on application from those interested.

It is reported in New York that a $50,000,000 syndicate, of which J. N. Huston, ex-treasurer of the United States, is the head, has taken up the work of constructing a canal across the Bayonne peninsula from New York bay to Newark bay and thence to South Newark, N. J. The new company has acquired the New York and Newark bay ship canal, which was incorporated in New Jersey thirty-four years ago. The plans contemplate the possible accommodation of 100 steamers at one time within the piers and basins jutting into New York harbor.

ELECTRIC FAN WITH DIRECT CONNECTED MOTOR.

In the accompanying illustration is presented a new type of electric fan, consisting of a Sturtevant Monogram blower and motor, constructed by the B. F. Sturtevant Co. of Boston, Mass., for direct connection to this fan. The field ring of the motor, which is of wrought iron, is attached to the side of the fan, and forms therefore a part of the enclosing frame of the motor. Within this frame is placed a cradle or double yoke, carrying two ring oiling bearings, which are self adjusting, and necessarily are kept in constant alignment.



The armature shaft is of large diameter, carrying the fan wheel upon its extended side, and projecting through the casing of the fan itself. The armature is of the drum type, and the commutator constructed of dropped forged segments. Carbon brushes are used, with self-feeding and adjusting holders of the socket type. A cast iron hood or casing with removable center is employed to enclose the entire motor, which is thus kept free from dust. A fan of this type, being small in size, and therefore readily portable, is serviceable for all purposes where a movement of air is desired, while the enclosed feature of the motor makes it possible to operate it in a dusty atmosphere. Sight feed oil cups supply oil to the bearings, and the overflow therefrom passes to a tank suspended beneath the frame, whence it may be removed at intervals.

Moran Bros Co., Seattle, Wash., recently successfully launched the ferry boat King County.

STRONG ENDORSEMENT OF TOOLS.

The Chicago Pneumatic Tool Co. is especially proud of a letter received a short time ago from the American Ship Building Co., which controls practically the entire ship building industry of the great lakes. The letter, used in a recent special issue of 158 testimonials from industrial establishments in all parts of the world, is from Gen. Mngr. James C. Wallace and is as follows:

"We take pleasure in stating that the different kinds of pneumatic tools furnished by you are all giving most efficient and satisfactory service. We are using your pneumatic hammers for chipping, calking, riveting; your air drills for reaming and tapping; your deck and yoke riveters on the inside and shell riveters on the outside of our ships. All are doing the finest kind of work; in fact, superior to hand work. With these tools we effect a great saving in cost over hand work, beside expediting the work greatly, and we are largely enabled to dispense with skilled mechanics on this work, as any handy laborer very quickly becomes proficient in the use of these tools. We are increasing our air compressing capacity and we will greatly extend our use of your pneumatic tools. We consider pneumatic tools as among the greatest labor savers of the day, and your tools as leaders in that line. We are not in the habit of writing testimonials, but believe your pneumatic appliances worthy of the best praise that can be given them."

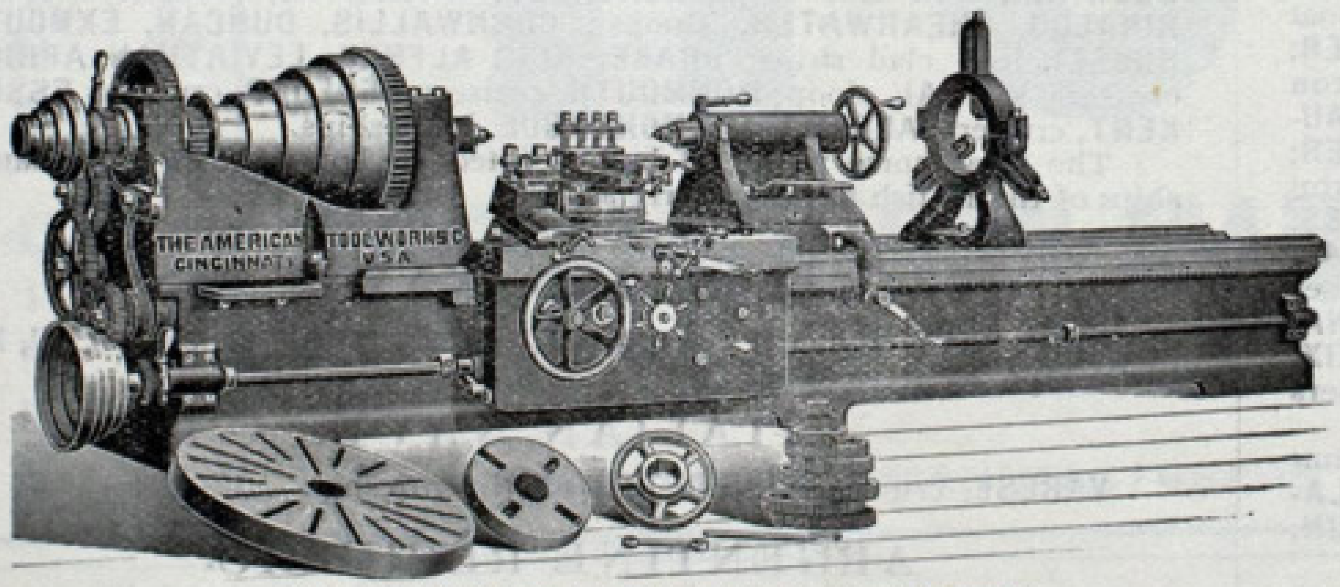
RUSSIAN MERCHANT MARINE.

William R. Holloway, consul general to St. Petersburg, contributes an interesting article to the state department upon the merchant marine of Russia. The merchant marine of Russia consisted on Jan. 1, 1898, of 604 steam and 2,294 sailing vessels. With the exception of the Black and Azof seas the sailing vessels predominate over steamers. The tonnage of the sailing vessels in the White sea is 81.5 per cent.; on the Baltic, 80.5 per cent.; on the Caspian, 66.4 per cent.; and on the Black and Azof seas only 27.7 per cent. The total value of steamers on Jan. 1, 1898, amounted to $41,612,000, against $39,191,000 in the preceding year. In point of value the fleets rank in the following order: Black and Azof, Caspian, Baltic and White. During 1897, forty-two new steamers were added to the merchant marine of Russia of which twenty-eight were built abroad and fourteen in Russia.

The following regulations have been adopted by the Russian government to promote the merchant marine: Vessels carrying the Russian flag to have the privilege of sailing between Russian ports lying in the different seas: the law of April 27, 1898, imposing a duty on vessels built abroad; extending the privilege of receiving the duty paid by Russian vessels in passing the Suez canal; the purchase of foreign vessels with payments in installments.

The Nickel Plate road will sell excursion tickets to students account the Easter vacation at one and one-third fare for the round trip. Tickets are available the day before school closes, the closing day and the day after, the return limit to cover period of vacation. Inquire of agents.
49, April 15

Tools for Economical Production.


THE AMERICAN TOOL WORKS C
CINCINNATI U.S.A.

36" STANDARD LATHE—HEAVY PATTERN.

We build complete lines of Machine Tools for machine shop equipments, viz:

Lathes, Planers,
Drills, Shapers,
Boring Mills, Etc.

Investigate our lines before buying.

The American Tool Works Co.,

BUILDERS OF COMPLETE LINES OF MACHINE TOOLS,

WORKS: CINCINNATI, U. S. A.

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PHILADELPHIA: The Fairbanks Co.
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BOSTON STORE: 36 Federal Street.
BALTIMORE: The Fairbanks Co.

SAN FRANCISCO: Henshaw, Bulkley & Co.
DENVER AND SALT LAKE CITY: The Mine & Smelter Supply Co.
LONDON: Alfred Herbert, Ltd., 7 Leonard St., Finsbury, E. C.
DÜSSELDORF: de Fries & Co., Act. Ges., Graf Adolf Strasse, 83-87

ANTWERP: Nyssens Freres, 33 Rue des Peignes.
BERLIN: de Fries & Co., Act. Ges., Kloster Strasse, 13-15.
PARIS: Roux Fréres & Cie., 54 Boulevard du Temple.
MOSCOW: Alfred Stucken.

AROUND THE GREAT LAKES.

A. W. Comstock and others of Alpena have sold the barge Abram Smith to Mitchell & Boland of Toledo for $15,000.

Mr. J. C. Gilchrist of Cleveland has purchased from the Lehigh Valley Transportation Co. of Buffalo the steamer Tacoma, a vessel of about 2,500 tons capacity. The consideration was about $65,000.

The Potter-Teare Lumber Co. of Cleveland has purchased the steamer Mary McGregor from S. H. Boyce. The McGregor will be sailed by Capt. Henry Brock, who has taken an interest in her.

A party of Chicago vessel men, composed mainly of owners of the steamers City of London (J. S. Dunham, managing owner) has purchased the steamer Black Rock from the Jenks Ship Building Co. of Port Huron.

Frank T. Goodwin, who formerly had charge of the engine department of the F. W. Wheeler ship yards of West Bay City, Mich., now occupies a similar position with the Jenks Ship Building Co. of Port Huron, Mich.

Mr. W. E. Lowrie, new general passenger agent of the Northern Steamship Co., Buffalo, announces that the first sailing from Buffalo of the large passenger steamers of the line, North West and North Land, will be on June 19.

John J. Boland of Buffalo now controls with Tonawanda parties the steamer Wetmore and consort Brunette, formerly of the Jones fleet of Cleveland. Mr. Boland has also purchased the schooners Delos DeWolf and John Magee of the same fleet.

The large package freight steamer which the Union Dry Dock Co. of Buffalo is to build for the Lehigh Valley Transportation Co. in addition to the steamer now under way for the same company, will be of the same dimensions as the Buffalo and Wilkes-Barre, except that she will be 30 feet instead of 28 feet deep.

Vacancies exist in the list of eligibles for positions of master, mate, first and second engineer in the ninth light-house district, which includes Lake Michigan and Green bay. Forms of application for civil service examination will be furnished all who apply by mail to Capt. J. G. Warren, United States Engineer, Milwaukee, Wis.

A dispatch from West Superior announces that D. E. Ford, superintendent Superior Shipbuilding Co., has accepted a position with a large eastern ship building company and resigned. Mr. A. B. Wolvin will, it is understood, act as manager, and W. A. Thompson, now in partnership with Capt. McDougall at Duluth, will be put in charge of construction work in the yard.

The light-house board has asked congress to increase to $100,000 the appropriation of $75,000 made by the last congress for the construction of a light and fog signal station to mark the outer end of the main channel entrance to Toledo harbor. The necessity for the increase is explained by the board by the fact that the price of construction material has enhanced considerably. The lowest bid received was $98,400.

A dispatch from Collingwood, Ont., announces that the Steel Ship Building Co., which has taken over the dry dock plant at that point and is to enter upon the construction of steel vessels, has a large amount of machinery ordered and on the ground, and it is hoped that the new works will be ready to put down the keel of a steel boat about June 1. Mr. Hugh. Calderwood, who was with the Superior Ship Building Co., will be superintendent of the Collingwood works.

Mr. J. T. Connery, manager of the Youghiogheny & Lehigh Coal Co., Chicago, announces that his company has acquired, in addition to their already large dock interests, the fueling dock of the New Kentucky Coal Co. at the junction of the Illinois Central slip C and the Chicago river. The equipment of the Y. & L. Co. now consists of three fueling docks, two fueling lighters, two Hunt hoists, twelve McMyler derricks, twelve flat scows and the tug A. B. Ward. Prices of steamboat fuel at Chicago for the coming season will be based on $3.75 a ton for Youghiogheny screened lump and $3.40 for New Kentucky screened lump.

Vessels managed by C. E. Jones of Cleveland, who died several weeks ago, have been disposed of as follows: Argo to Argo Steamship Co., Cleveland; Wetmore to John J. Boland, Buffalo; Rhoda Emily to Saginaw Bay Co., Cleveland; Desmond to Kelley Island Lime & Transport Co., Cleveland; A. G. Lindsay to Cleveland Box Co., Cleveland; Argonaut to J. E. Mills, Port Huron, Mich.; Brunette to John J. Boland, Buffalo; Hattie to Saginaw Bay Co., Cleveland; Charles Wall to Sandusky Lumber & Box Co., Sandusky O.; John T. Mott to J. M. Jones, Detroit; Canton to C. May Jones, Los Angeles, Cal.; Delos DeWolf to John J. Boland, Buffalo; Sunshine to Alvin Peter, Toledo, O.; John Magee to John J. Boland, Buffalo.

VALUE OF STOCKS–LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of March 28. 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire	56⅝	58	56⅝	58
American Steel & Wire, Pfd	91⅛	91⅛	90½	90½
Federal Steel	54¼	54½	53⅞	54¼
Federal Steel, Pfd	75⅞	76	75⅞	76
National Steel	45⅞	45⅞	45	45
National Steel, Pfd	......	......	......	......
American Tin Plate	34	34	33½	33½
American Tin Plate, Pfd	......	......	......	......
American Steel Hoop	37	37¼	36	36¼
American Steel Hoop, Pfd	80½	82	80½	81
Republic Iron & Steel	23	......	......	23
Republic Iron & Steel, Pfd	66⅛	......	......	66⅛

BELLEVILLE GENERATORS.

GRAND PRIZE AT THE WORLD'S FAIR OF 1889.

List of Ocean Steamships on Board which BELLEVILLE GENERATORS are Used.

FRENCH NAVY.

Despatch Boat **VOLTIGEUR**; Squadron's Look-out Ship **MILAN**; Squadron's Look-out Ship **HIRONDELLE**; Gunboat **CROCODILE**; Despatch Boat **ACTIF**; Cruiser **AMIRAL RIGAULT DE GENOUILLY**; Iron Clad Cruiser **ALGER**; Iron Clad Cruiser **LATOUCHE-TREVILLE**; Iron Clad Cruiser **CHANZY**; Iron Clad Cruiser **AMIRAL CHARNER**; Tug **ABERVRAC'H**; Despatch Boat **CAUDAN**; Torpedo Despatch Boat **LEGER**; Torpedo Despatch Boat **LEVRIER**; Battleship **BRENNUS**; Protected Coast Guard **AMIRAL TREHOUART**; Iron Clad Cruiser **BRUIX**; Iron Clad Cruiser **BUGEAUD**; Cruiser **DESCARTES**; Battleship **BOUVET**; Cruiser **POTHUAU**; Cruiser **GALILEE**; Cruiser **PASCAL**; Cruiser **CATINAT**; Battleship **CHARLEMAGNE**; Cruiser **LAVOISIER**; Cruiser **PROTET**; Battleships **GAULOIS, SAINT LOUIS** and **HOCHE**; Iron Clad **IENA**; Cruiser **DESAIX**; Iron Clad Cruiser **DUPETIT-THOUARS**; Cruiser **DUPLEIX**; Cruiser **FURIEUX**; Battleship **NEPTUNE**; Battleship **DEVASTATION**; Cruisers **SULLY, AMIRAL AUBE** and **MARSEILLAISE.**

MESSAGERIES MARITIMES: Cargo Steamer **ORTEGAL**; Mail Steamships **SINDH, AUSTRALIEN, POLYNESIEN, ARMAND-BEHIC, VILLE-DE-LA-CIOTAT, ERNEST-SIMONS, CHILI, CORDILLERE, LAOS, INDUS, TONKIN, ANNAM, ATLANTIQUE.**

COMPAGNIE DES CHEMINS DE FER DE L'OUEST, (Plying between Dieppe and Newhaven): Freight Steamers **ANGERS, CAEN, BREST, CHERBOURG**; Fast Steamers **TAMISE, MANCHE, FRANCE.**

RUSSIAN NAVY.

Iron Clad Frigate **MININE**; Gunboat **GROZIASTCHY**; Imperial Yacht **MAREVO**; Imperial Yacht **STRELA**; Gunboat **GREMIASCHY**; Gunboat **OTVAJNI**; Imperial Yacht **TZAREWNA**; Imperial Yacht **STANDARD**; Cruiser **ROSSYA**; School Ship **VERNY**; Cruiser **SVETLANA**; Cruiser **DIANA**; Cruiser **PULLADA**; Torpedo Transport Boat **BAKAN**; **KHERSON** and **MOSKBA**, Ships of the Volunteer Fleet; Gunboat **GILACH**; Iron Clad **EKATERINA II**; Gunboat **KOUBANETZ**; Cruiser **AURORA**; Iron Clad **EMPEREUR NICOLAS I**; Iron Clad **PRINCE POTIEMKINE DE TAURIDE**; Cruiser **BAYAN**; Iron Clad **CESAREWITCH**; Gunboats **TERETZ** and **OURALETZ**; Iron Clad **BORODINOW**; **SMOLENSK**, Ship of the Russian volunteer fleet; cruiser **BOJARINE.**

ENGLISH NAVY.

Torpedo Boat Destroyer **SHARPSHOOTER**; **POWERFUL** and **TERRIBLE**, iron clad cruisers; **GLADIATOR, ARROGANT, FURIOUS, VINDICTIVE**, cruisers; **NIOBE, DIADEM, ANDROMEDA, EUROPA**, cruisers; **CANOPUS, GLORY, GOLIATH, ALBION, OCEAN**, iron clad ships; **ARGONAUT, ARIADNE, AMPHITRITE, SPARTIATE, HERMES, HIGHFLYER** and **HYACINTH**, cruisers; **VENGEANCE**, iron clad; **ALBERT AND VICTORIA**, royal yacht; **CONDOR** and **ROSARIO**, sloops; **CRESSY, ABOUKIR, SUTLEY** and **HOGUE**, cruisers; **IMPLACABLE, FORMIDABLE** and **IRRESISTIBLE, VENERABLE, LONDON, BULWARK**, iron clad ships; **EURYALUS, BACHANTE**, cruisers; **MUTINE; RINALDO, SHEARWATER**, sloops; **CORNWALLIS, DUNCAN, EXMOUTH, RUSSEL**, iron clad ships; **DRAKE, KING ALFRED, LEVIATHAN, AFRICA**, cruisers; **VESTAL**, sloop; **MONMOUTH**, cruiser; **BEDFORD**, cruiser; **ESSEX, KENT**, cruisers; **ALBEMARLE, MONTAGUE**, battleships.

The total horse power of boilers fitted on board the 57 above named ships of the British navy is nearly 900,000.

AUSTRIAN NAVY.

BUDA-PEST, iron clad coast guard; **KAISER KARL VI**, cruiser; **X', X'''**, battleships.

ITALIAN NAVY.

VARESE, cruiser; **BENEDETTO BRIN**, battleship.

ARGENTINE REPUBLIC.

PUEYRREDON, cruiser; Steamships **PUERTO-HUERGO** and **MENDOZA.**

SPANISH NAVY.

REINA REGENTE, cruiser.

CHILIAN NAVY.

O'HIGGINS, cruiser; **ALMIRATE LYNCH**, torpedo boat destroyer; **ALMIRANTE CONDELL**, torpedo boat destroyer; **GENERAL BAQUEDANO**, school ship.

JAPANESE NAVY.

SHIKISHIMA, iron clad; **CHIYODA**, cruiser; **ASAHI**, iron clad; **IWATE**, cruiser; **AZUMA**, cruiser; **HATSUSE**, iron clad; **ITSUKUSHIMA**, iron clad coast guard; **MIKASA**, battleship.

UNITED STATES OF AMERICA.

Northern Steamship Co.'s Passenger Steamers **NORTH WEST** and **NORTH LAND**, of 7,000 H. P. each; yachts **SHEARWATER, CORYELL, WILD DUCK, SULTANA.**

Cable Address: BELLEVILLE SAINT-DENIS-SUR-SEINE. **General Information Sent on Demand.**

A WONDERFUL LITTLE PUMP.

Editor Marine Review:—In a recent issue of your paper I read the account of the trial trip of the steam yacht Dreamer, built by Lewis Nixon of the Crescent Ship Yard for Mr. Thomas W. Lawson of Boston, and I noticed you made mention of the Blake simplex featherweight air pump as being a certain size, which shows that the types got the figures transposed, making the steam cylinder bigger than the air cylinder. As a matter of fact, this little air pump has only a 4-inch steam cylinder with an 8-inch air cylinder, the stroke of both being 6 inches. In other words, the types got the "cart before the horse" in quoting the size of the pump. The most remarkable part of this pump is the fact that it only weighs 270 pounds, and yet was able to take care of the engines when developing 1,246 I. H. P. maximum, holding 26 inches vacuum. This was when the boat was under forced draft. Under natural draft, with engine developing about 850 H. P., the featherweight air pump pulled down 27 inches vacuum at moderate speed. All of which shows that the efficiency of this size pump is quite as remarkable as its extreme light weight.

F. MERIAM WHEELER,
Secretary The George F. Blake Mnfg. Co.

New York, March 27, 1900.

The schooner John E. Devlin of 1,107 gross tons register was launched by Washburn Bros., Thomaston, Me., last week.

TRADE NOTES.

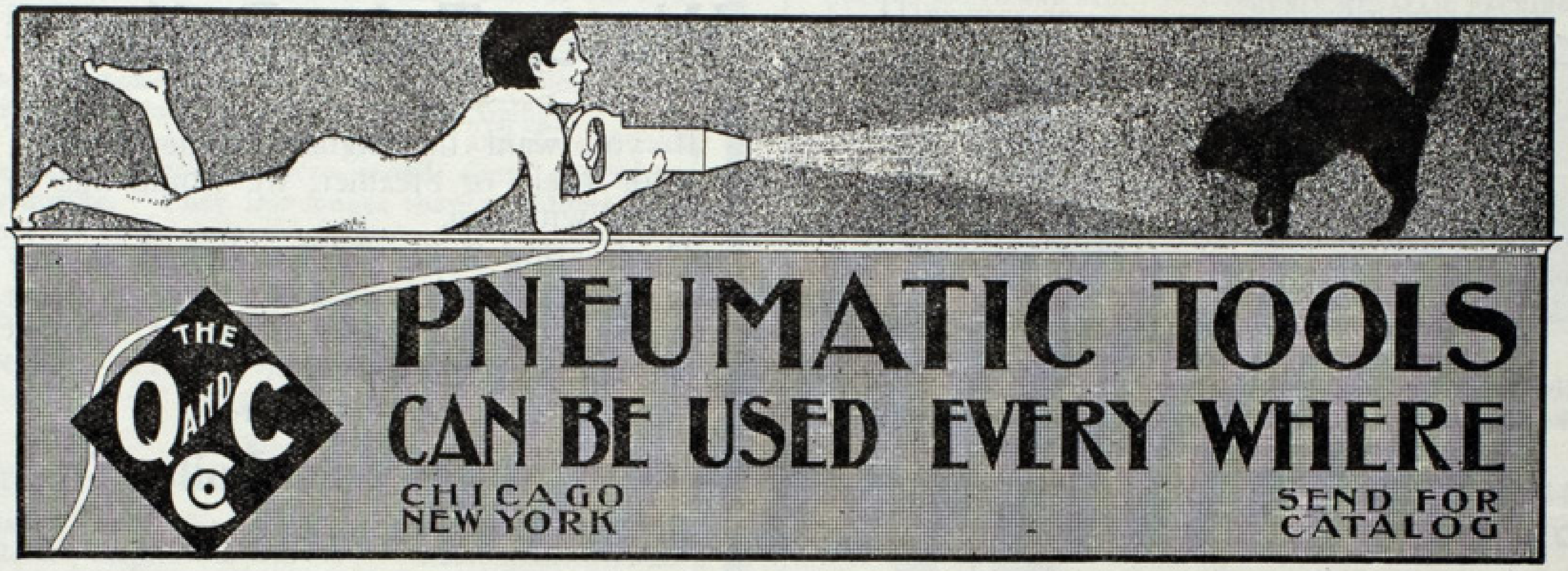
The National Tube Co. has just received a large order from the government for 70,000 tubes, price $225,000, for vessels being built for the United States navy.

It is announced that the new steel and iron plant which is being built at Tonawanda, N. Y., will be completed by July 1 next, for the financial interests connected with the Inland Steel Co. of Chicago. It will represent an investment of $300,000 and will employ about 300 men.

The Chicago Pneumatic Tool Co., Monadnock building, Chicago, will soon be in the market for a quantity of machine tools. These tools will be required for equipping a factory which they have acquired at Olney, near Germantown, Pa. The new plant will be known as the Philadelphia works of the Chicago Pneumatic Tool Co. The buildings, which will be fitted for the manufacture of pneumatic tools, formerly constituted a copper smelting plant and rolling mill.

New Bedford parties have contracted with Messrs. Dunn & Elliot of Thomaston, Me., to build a wooden vessel of about 1300 tons capacity.

CAPT. GEO. A. SIMPSON, Expert Compass Adjuster,
19 YEARS EXPERIENCE.
Yearly Contracts Solicited. Nautical Instruments Repaired.
OLD 'PHONE No 319. SAULT STE. MARIE, MICH.



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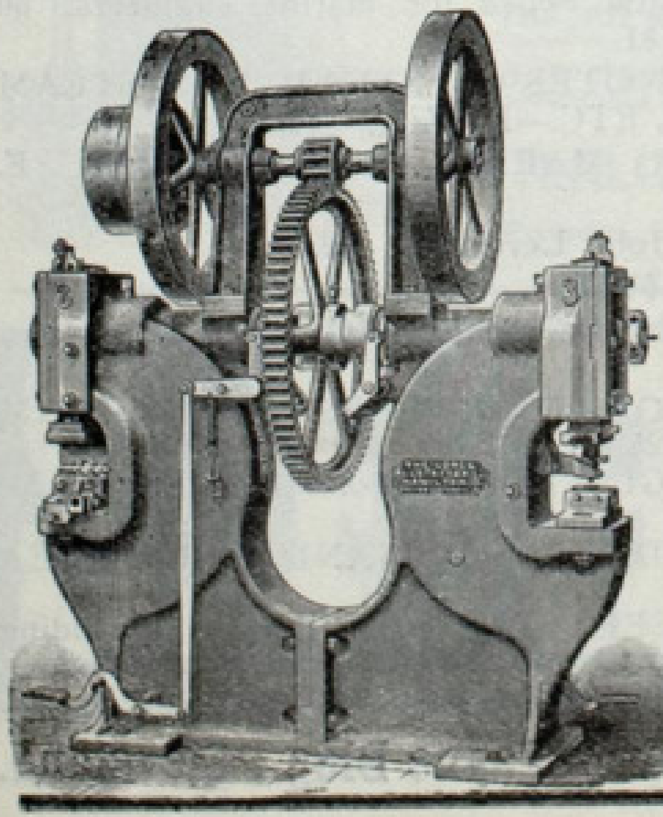
TOWING AND SHIPS' LINES HAWSERS

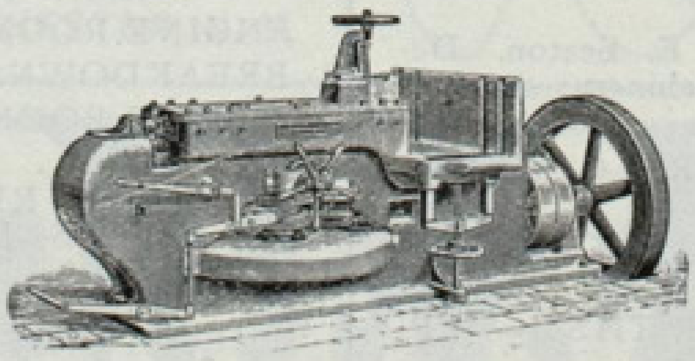
ROPE

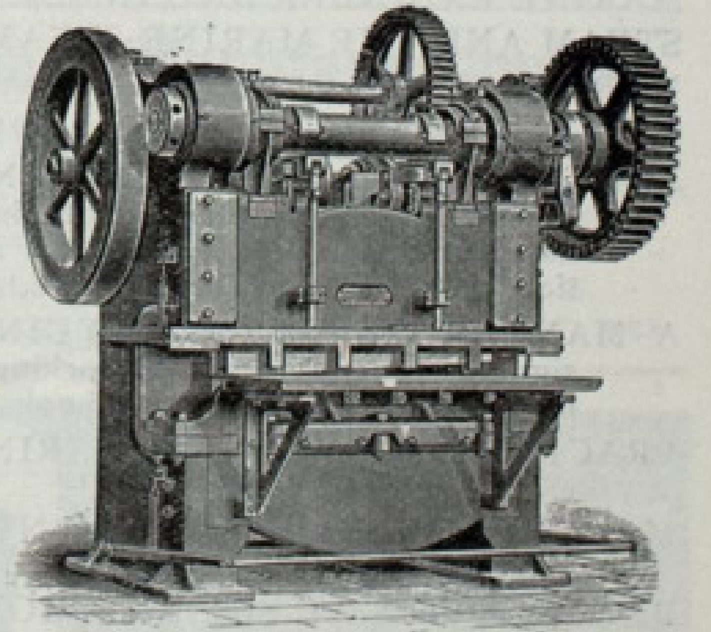
THE AMERICAN MANUFACTURING CO.
65 WALL STREET, NEW YORK.
THE LARGEST MANUFACTURERS OF FIBER IN THE WORLD.

A SPECIALTY:
4-STRAND PLUMBAGO HEART
HOISTING ROPE FOR CARGO FALLS

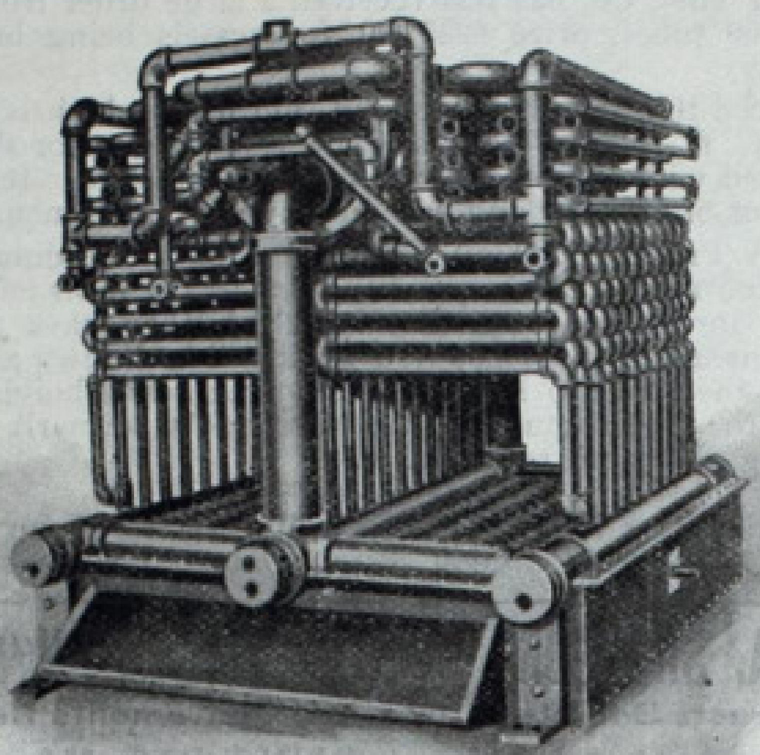
LABOR-SAVING PUNCHES
NEW CATALOGUE
NOW READY.
SHEARS







For All Kinds of Work.
MANUFACTURED BY
THE LONG & ALLSTATTER CO., HAMILTON, OHIO.



December 12, 1899.
Dearing Water Tube Boiler Co.,
Detroit, Mich.

Gentlemen:—After four years' use of the Dearing Boiler in the "I. C. U." yacht, we are perfectly satisfied. It weighs about five hundred pounds less than the Boiler we had before, occupies considerable less space, and makes enough more steam to increase the speed of our boat over five miles an hour. Since putting in your boiler, we have made twenty-eight miles in one hour and six minutes. Yours very truly,
Rocklemann Bros.

25½ Miles an Hour.

With less floor space, and a decrease of over 500 lbs. weight, the Dearing Water Tube Boiler increased the speed of the I. C. U. Yacht five miles an hour over another type of water tube boiler.

This is only one of hundreds of testimonials of similar character for

The Dearing Water Tube Boiler.

If you want the highest efficiency in a boiler for Yacht or Steamer, we would like to correspond with you.

The Dearing Boiler fulfills all the requirements of ideal marine service, the maximum power with minimum weight and space. Orders filled promptly for any capacity.

New catalogue just off the press.

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Books on Marine Engineering, on the Operation of Engines and for Beginners in the Engine Room.

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STEAM BOILERS—Joshua Rose. Practical treatise on construction and examination—Seventy-three engravings. $2.

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MARINE ENGINEER AND GUIDE BOOK—Bergen. $5.

STEAM AND THE MARINE STEAM ENGINE—Jno. Yeo. $2.50.

MARINE STEAM ENGINES—Sennett & Oram. $6.

STEAM—Wm. Rupper. Cloth bound, 80 cents; half leather, $1.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. $3.

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BREAKDOWNS AT SEA AND HOW TO REPAIR THEM—A. R. Leask. 252 pages. $2.

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USEFUL HINTS TO SEAGOING ENGINEERS—How to avoid and repair breakdowns. $1.40.

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MARINE PROPELLERS—By Barnaby. $4.25.

ELEMENTARY ENGINEERING—By Brewer. 60 cents.

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TREATISE ON SCREW PROPELLERS—By Chase. $3.

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STEAMSHIPS AND THEIR MACHINERY—By Haldane. $6.

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TRIPLE EXPANSION ENGINES—By Wingate. $1.

KEY TO ENGINEERING, WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY and ENGINEER'S EPITOME—Three excellent little books for marine engineers. 50 cents each, or the three for $1.

LESSONS AND PRACTICAL NOTES ON STEAM, THE STEAM ENGINE, PROPELLERS, ETC.—By King. $2.

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A READY REFERENCE FOR ENGINEERS AND STEAM USERS—J. B. Stanwood. 25 cents.

A LIBRARY OF STEAM ENGINEERING—John Fehrenbatch, M. E. $5.

THE NAVAL ENGINEER AND THE COMMAND OF THE SEA—F. G. Burton. $1.25.

MECHANICS' AND ENGINEERS' POCKET BOOK, including Naval Architecture, Steam and the Steam Engine, Steam Vessels, etc. 64th edition, 1050 pages. Chas. H. Haswell. $4.

Sent to any address, carriage prepaid, at prices named. **The Marine Review Pub. Co., Perry-Payne Bldg., Cleveland.**

SHELBY
SEAMLESS
COLD DRAWN STEEL
BOILER TUBES

SHELBY
SEAMLESS
COLD
DRAWN

REPRODUCED FROM A PHOTOGRAPH OF ONE OF OUR BOILER TUBES WHICH WAS FLATTENED AND THEN TWISTED WITHOUT SHOWING SIGNS OF FAILURE.
IT SHOWS THE STRENGTH OF OUR TUBING AND ITS VAST SUPERIORITY OVER LAP-WELDED TUBING WHICH COULD NOT STAND SUCH A TEST.

BURRELL & FOWLER—CLEV'D O.

Shelby Cold Drawn Seamless Steel Tubes are made from the most carefully selected stock with but one heating, from the original round billet.

They are cold drawn, which method of manufacture makes it impossible for the tubes to contain blow holes or other imperfections found in lapwelded tubing.

They are smooth inside and out, and do not easily collect scale. They are very tough, dense and exceedingly ductile. They last longer than any tubes made. Do not fail at the ends nor crack.

Write for Catalog "C"

SHELBY STEEL TUBE COMPANY,
GENERAL OFFICES, AMERICAN TRUST BUILDING,
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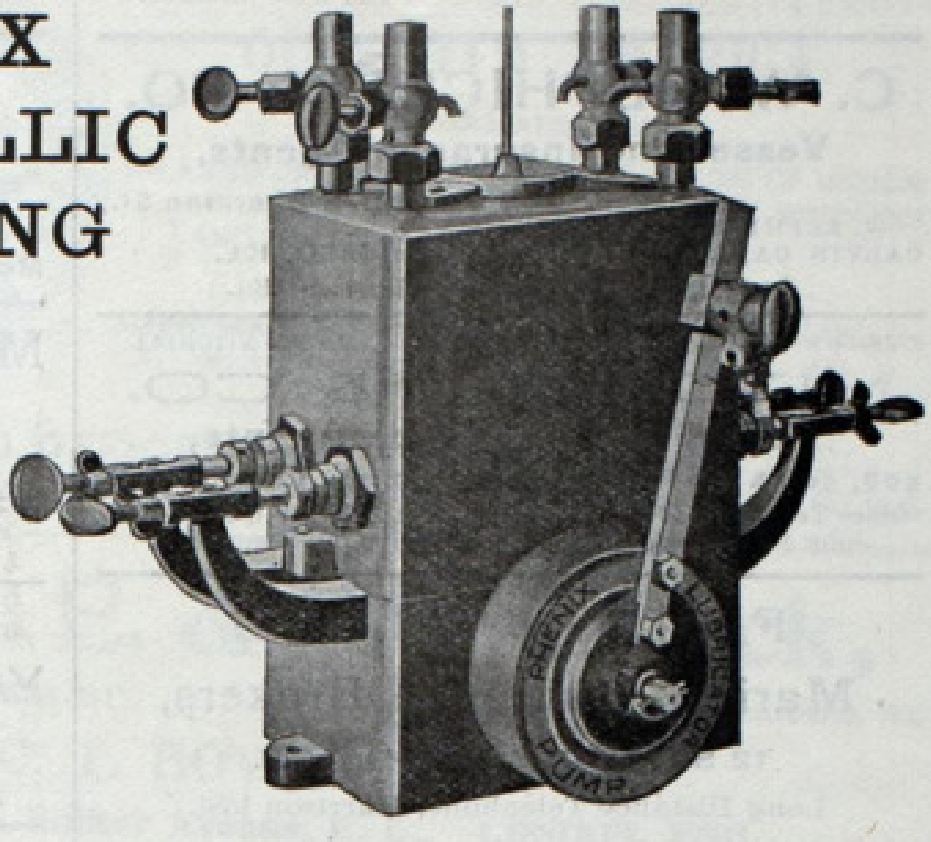

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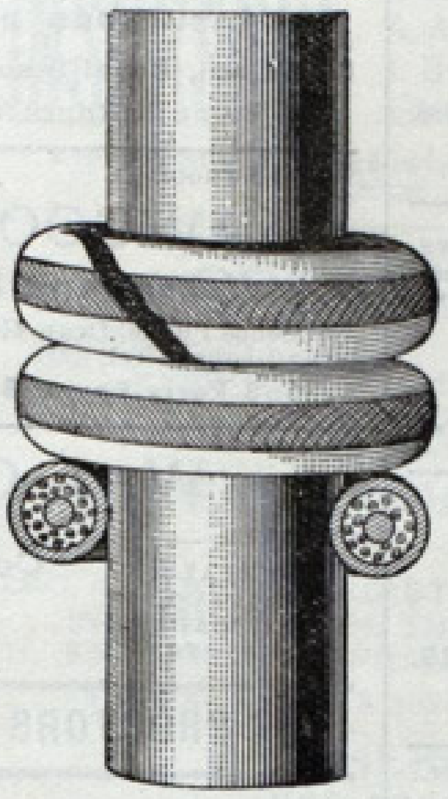

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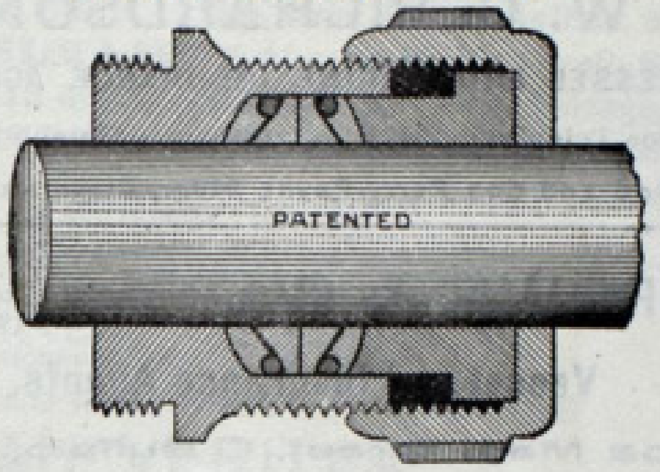

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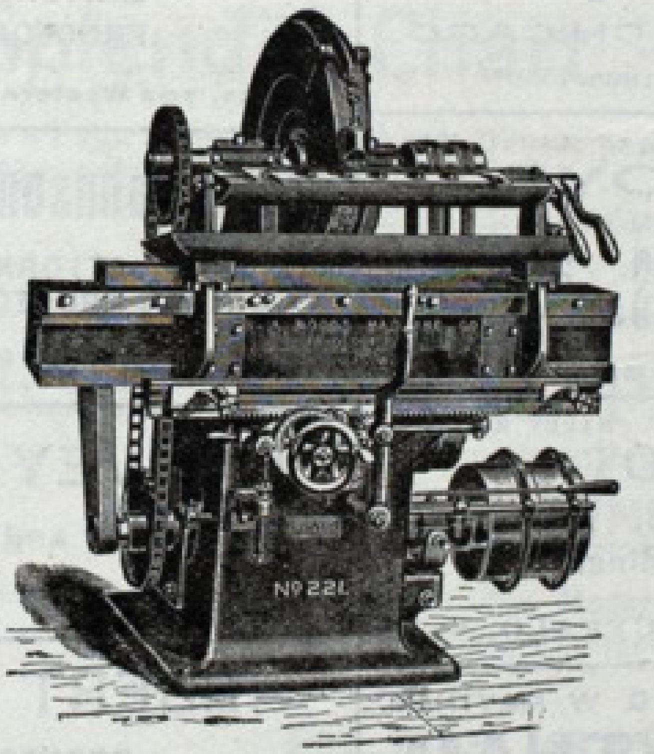

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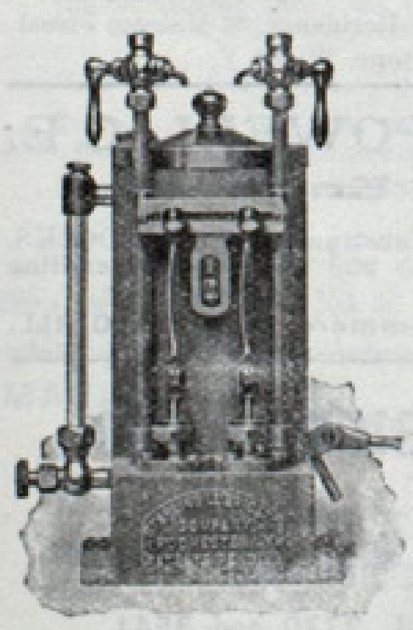

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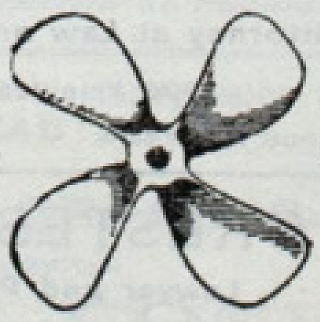

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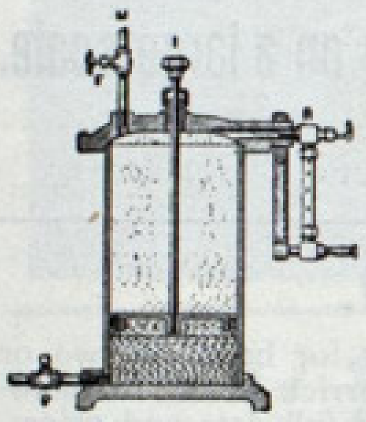

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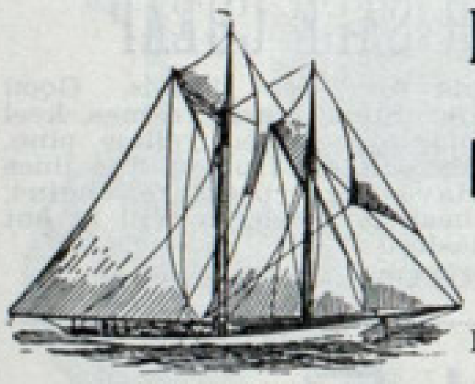

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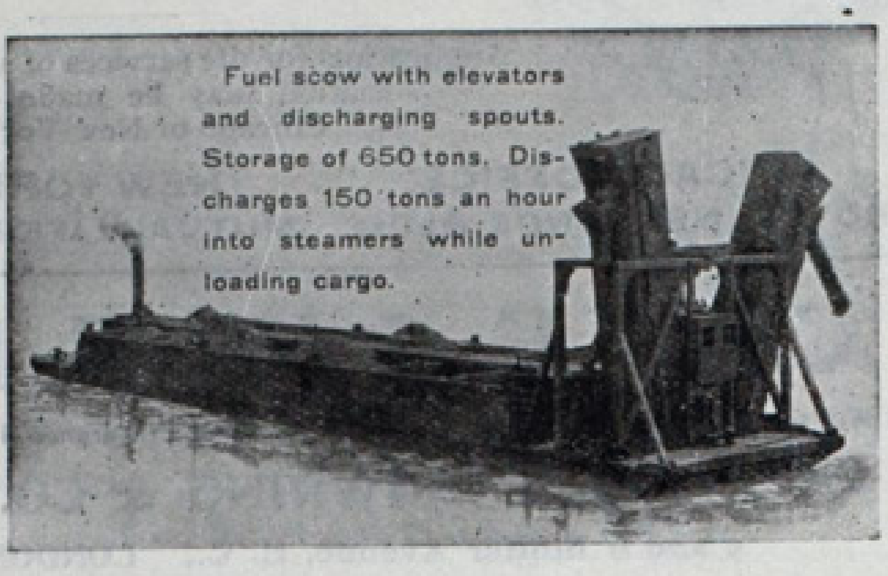

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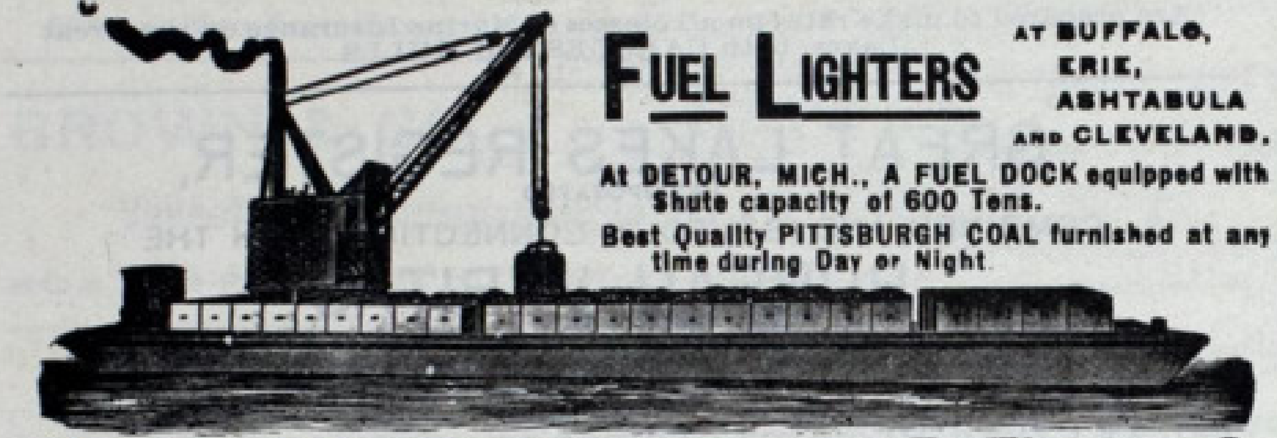

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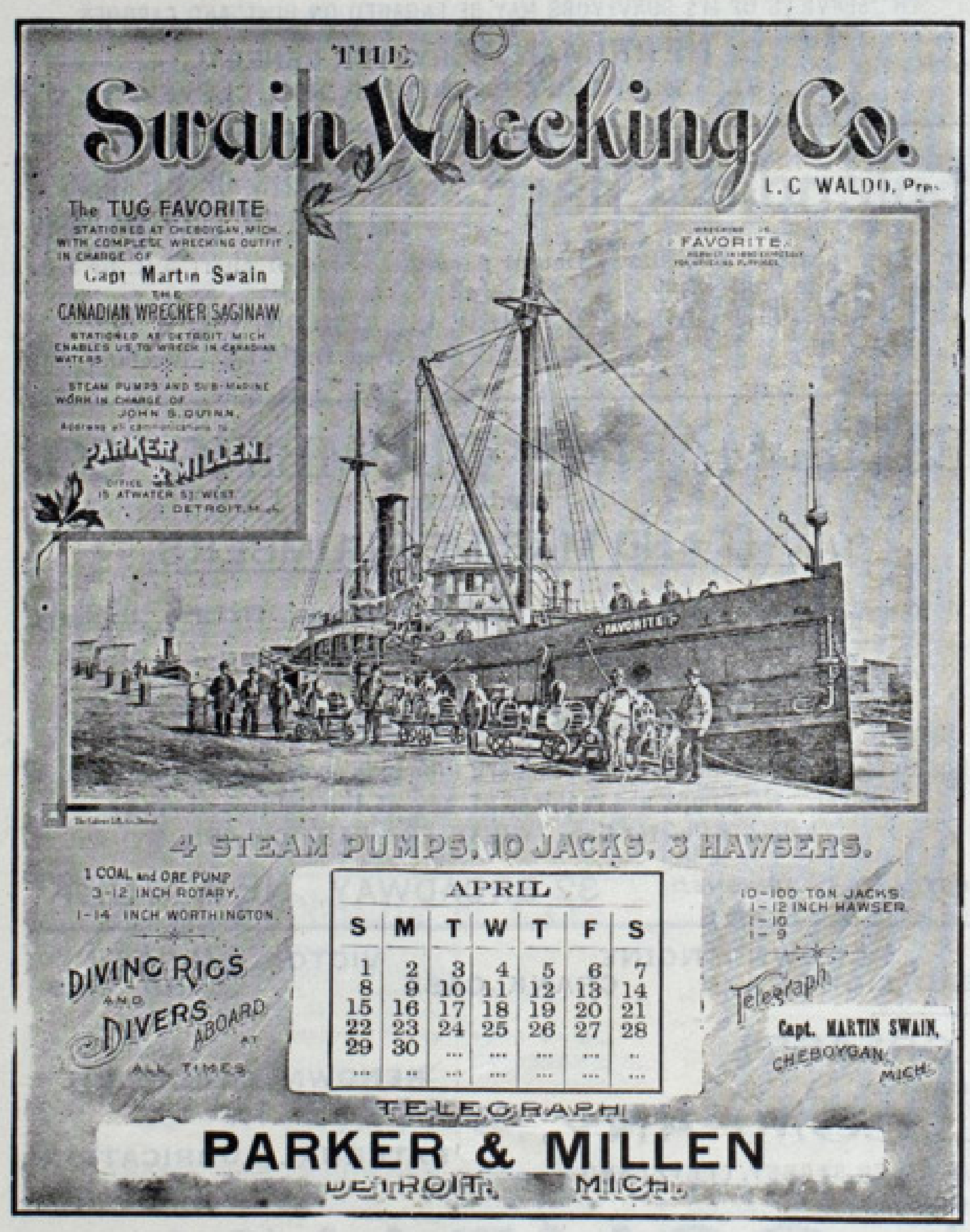

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U. S. Engineer Office, 1637 Indiana Ave., Chicago., Ill., March 21, 1900. Sealed proposals for manufacture and erection of superstructure for double track Railroad Bridge across Illinois and Mississippi Canal near Wyanet, Ill., will be received here until 12 noon, April 10, 1900, and then publicly opened. Information furnished on application. J. H. Willard, Major, Engrs. Apr. 5.

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Sealed proposals will be received at the office of the Light-House Board until 2 o'clock, p. m., March 30, 1900, and then opened for furnishing the materials and labor of all kinds necessary for the construction and delivery of the steam wooden light-vessel, No. 74, delivered at the Buoy Depot at Little Diamond Island, Portland Harbor, Maine, in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to this office. F. J. Higginson, Rear Admiral, U. S. N., Chairman. Mar. 29.

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., March 15, 1900. Sealed proposals for constructing foundations for four arch culverts and for constructing fourteen pipe culverts under Illinois and Mississippi Canal and for other work and material of same character will be received here until 12, noon, April 16, 1900, and then publicly opened. Information furnished on application here or to Assistant Engineer L. L. Wheeler, Rock Falls, Ill. J. H. Willard, Maj., Engrs. April 5

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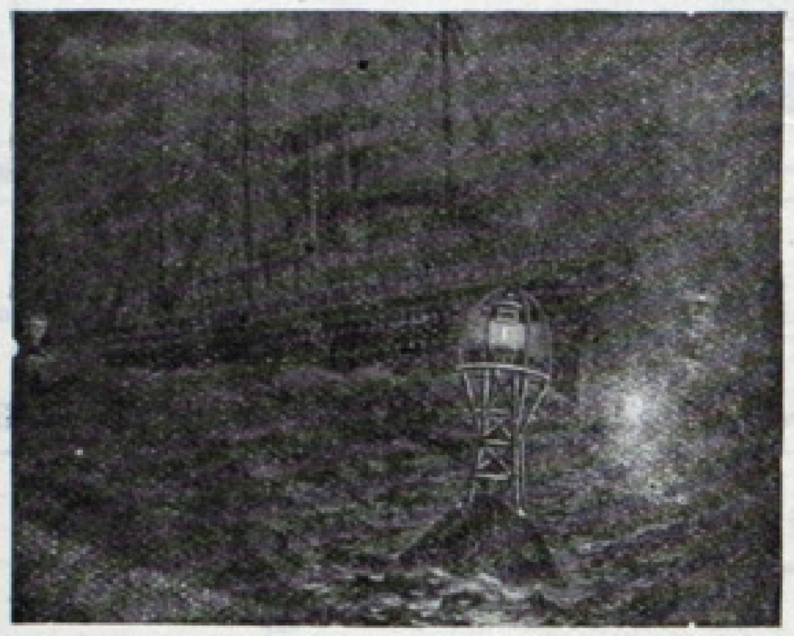

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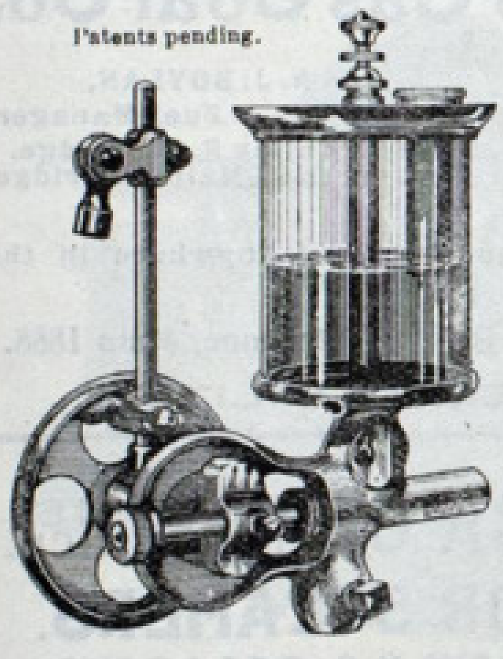

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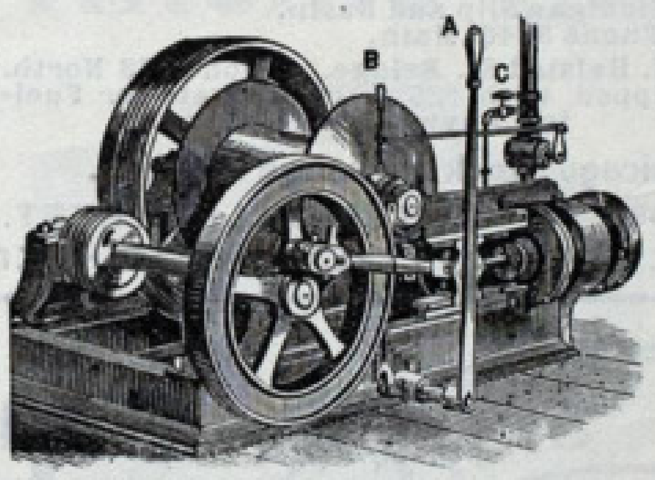

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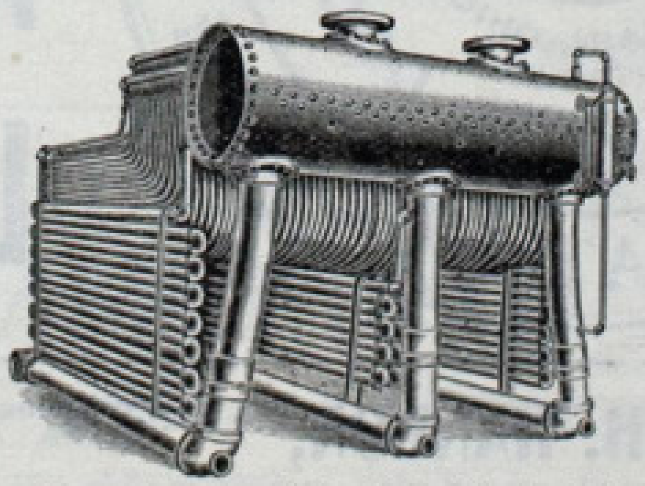

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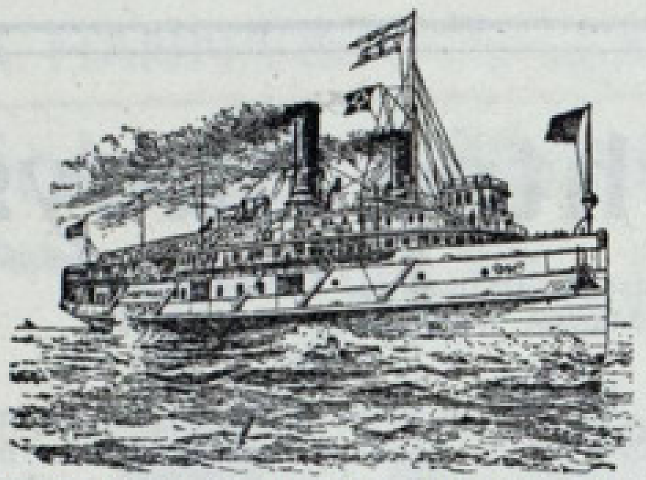

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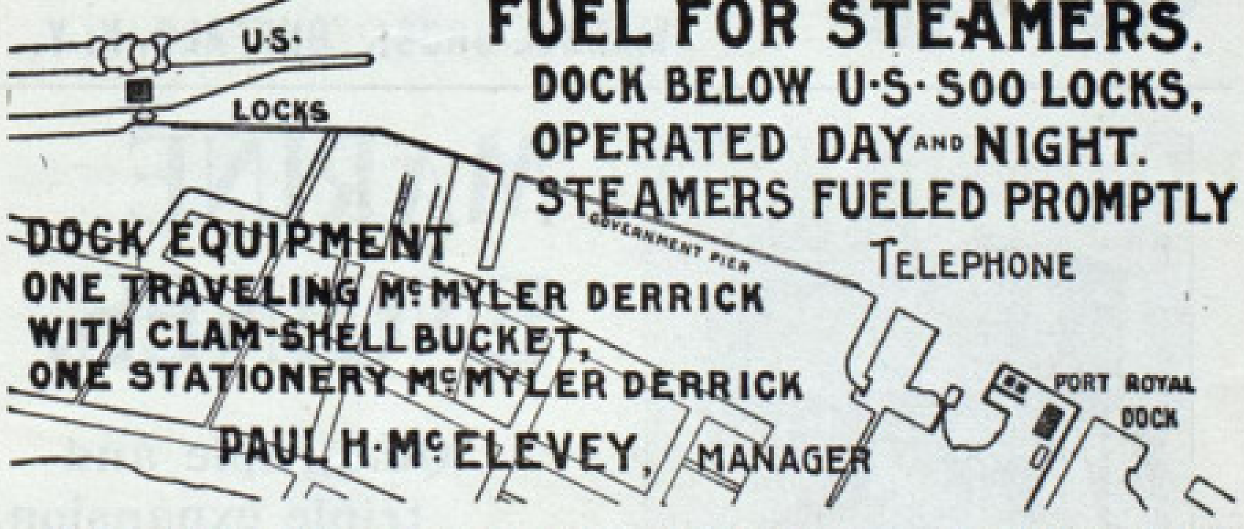

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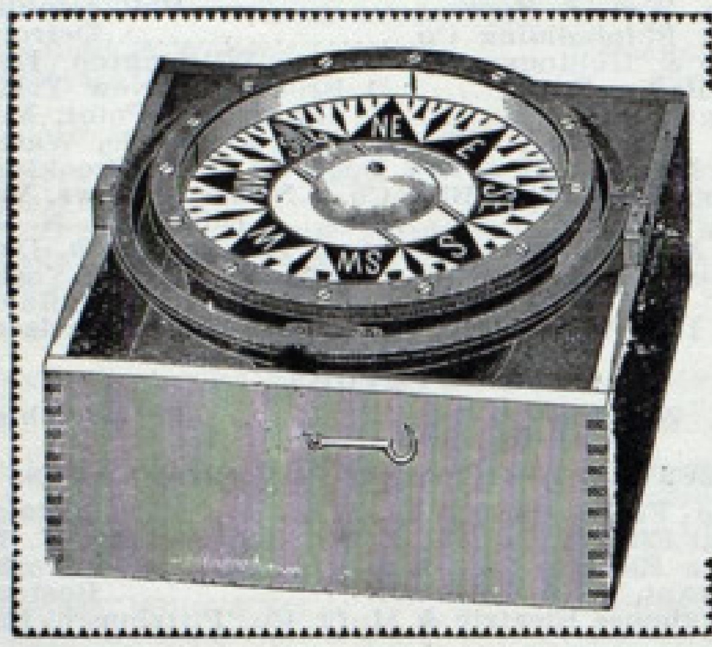

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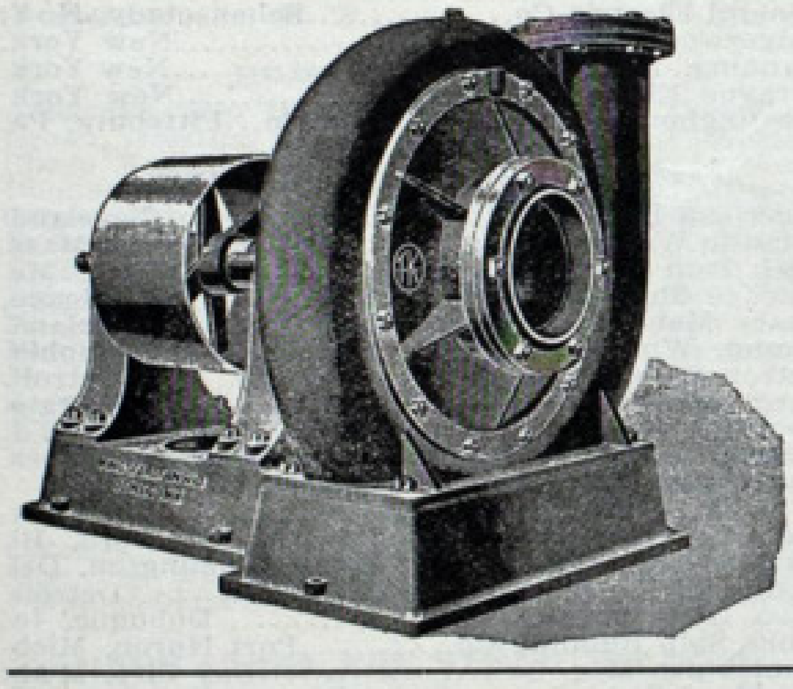

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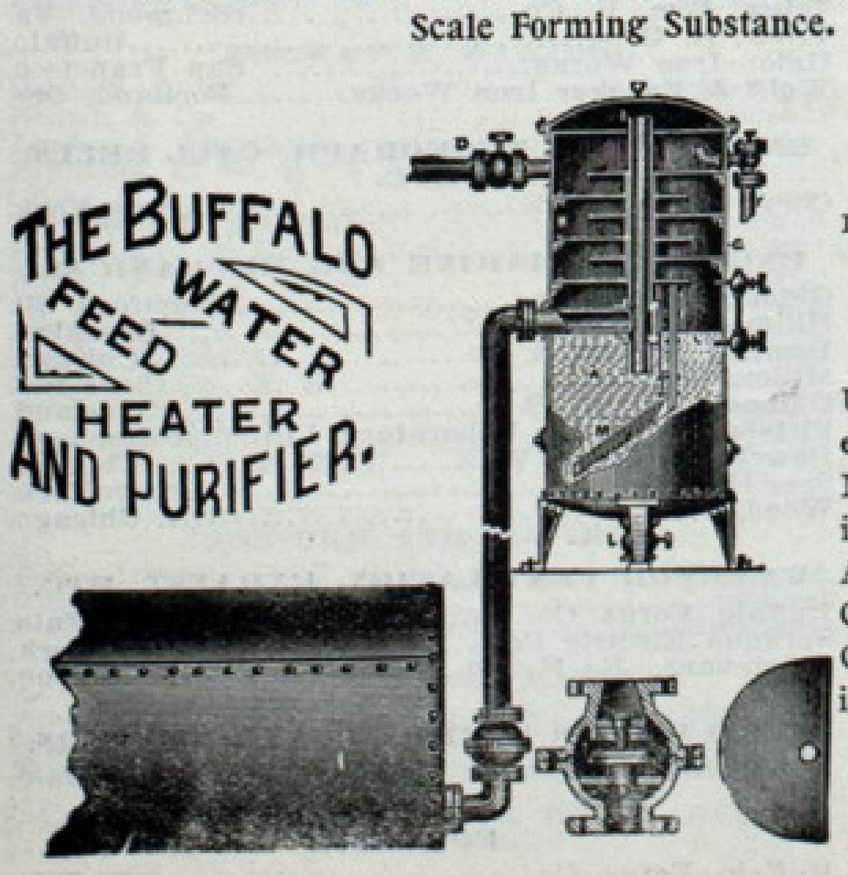
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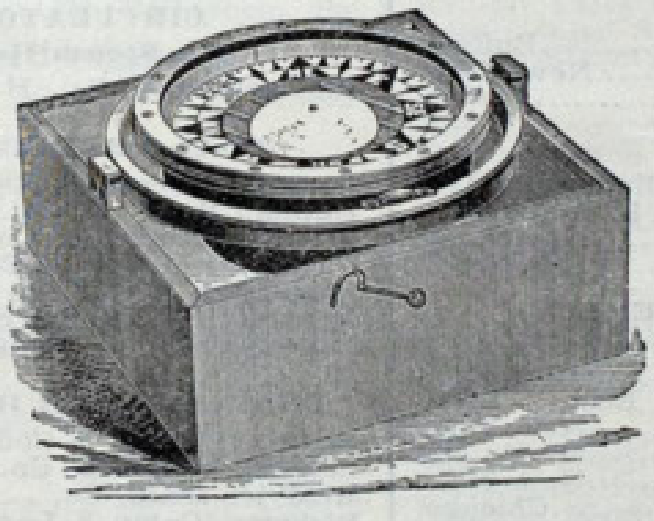

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Buffalo Forge Co...............................Buffalo.
Sturtevant Co., B. F...........................Boston.

FORGINGS, IRON AND STEEL.

Bethlehem Steel Co.................South Bethlehem.
Bourne-Fuller Co.............................Cleveland

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.
Page Bros. & Co..........Boston.

FLUSHOMETERS.
Kenney, The Co..........New York.

FUELING COMPANIES AND COAL DEALERS.
Castner, Curran & Bullitt (Pocahontas)..........Philadelphia.
Graham, James & Co..........Detroit.
Hanna, M. A. & Co..........Cleveland.
Hanlon, Mark H..........Cleveland.
Osborne, Saeger & Co..........Cleveland.
Pickands, Mather & Co..........Cleveland.
Port Royal Dock Co..........Sault Ste. Marie, Mich.
Pittsburgh & Chicago Gas Coal Co..........Cleveland.
Rochester & Pittsburgh Coal & Iron Co..Buffalo.
Smith, Stanley B. & Co..........Detroit.
Youghiogheny & Lehigh Coal Co..........Chicago.

FURNACES FOR BOILERS.
Continental Iron Works..........New York.

GAS BUOYS.
Safety Car Heating & Lighting Co..........New York.

GAS ENGINES.
Giddings & Stevens..........Rockford, Ill.
McMyler Mnfg. Co..........Cleveland.

GAGES, STEAM AND VACUUM.
American Steam Gauge Co..........Boston.
Ashton Valve Co..........Boston.
Crosby Steam Gage & Valve Co..........Boston.
Manning, Maxwell & Moore..........New York.
See also valves and steam specialties.

GRAPHITE.
Dixon Crucible Co., Joseph..........Jersey City, N. J.

HAMMERS, PNEUMATIC.
Chicago Pneumatic Tool Co..........Chicago.
Philadelphia Pneumatic Tool Co..........Philadelphia.
Q. & C. Co..........Chicago.

HAMMERS, POWER DROP.
Bement, Miles & Co..........Philadelphia.
Chase Machine Co..........Cleveland.

HEATING APPARATUS.
Sturtevant Co., B. F..........Boston.

HOISTING ENGINES.
American Ship Building Co..........Cleveland.
Brown Hoisting & Conveying Mach. Co..Cleveland.
Chase Machine Co..........Cleveland.
Donohue & Co., John T..........Baltimore.
General Electric Co..........New York.
Hodge, S. F. & Co..........Detroit.
Hyde Windlass Co..........Bath, Me.
Lidgerwood Mnfg. Co..........New York.
Manning, Maxwell & Moore..........New York.
McMyler Mnfg. Co..........Cleveland.
Marine Iron Co..........Bay City.
Sprague Electric Co..........New York.
Williamson Bros..........Philadelphia.
Westinghouse Electric & Mnfg. Co..........Pittsburg.

HOSE—AIR.
Chicago Pneumatic Tool Co..........Chicago.
Manning, Maxwell & Moore..........New York.
Philadelphia Pneumatic Tool Co..........Philadelphia.

INDICATORS FOR STEAM ENGINES.
American Steam Gauge Co..........Boston.
Ashton Valve Co..........Boston.
Ashcroft Mnfg. Co..........New York.
Crosby Steam Gage & Valve Co..........Boston.

INJECTORS.
Jenkins Bros..........New York.
Hayden & Derby Mnfg. Co..........New York.
Penberthy Injector Co..........Detroit.

INSURANCE, MARINE.
Bartow, J. H..........Cleveland.
Brown & Co..........Buffalo.
Drake & Maytham..........Buffalo.
Elphicke, C. W. & Co..........Chicago.
Gibbs & Joys..........Milwaukee.
Hawgood & Moore..........Cleveland.
Hutchinson & Co..........Cleveland.
Keith, J. G. & Co..........Chicago.
La Salle & Co..........Duluth.
Mitchell & Co..........Cleveland.
Myers, James A..........Chicago.
Osborn & Co., F. H..........Chicago.
Pauly, H. J..........Milwaukee.
Parker & Millen..........Detroit.
Peck, Chas. E. & W. F.....New York and Chicago.
Richardson, W. C..........Cleveland.

IRON ORE AND PIG IRON.
Bourne-Fuller Co..........Cleveland.
Hanna, M. A. & Co..........Cleveland.
Pickands, Mather & Co..........Cleveland.

LATHES OF ALL KINDS.
American Tool Works Co. (The)..........Cincinnati.
Bement, Miles & Co..........Philadelphia.
Manning, Maxwell & Moore..........New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.
Armstrong Cork Co..........Pittsburg.
Drein, Thos. & Son..........Wilmington, Del.
Kahnweiler's Sons, D..........New York.
Lane & DeGroot..........Brooklyn.

LIFE BOATS—METALLIC.
Drein, Thos. & Son..........Wilmington, Del.
Kahnweiler's Sons, D..........New York.

LIGHTS, SIDE AND SIGNAL.
Page Bros. & Co..........Boston.

LUBRICATING PUMPS.
Manzel Bros..........Buffalo.
Phenix Metallic Packing Co..........Chicago.
Sterling Lubricator Co..........Rochester, N. Y.

MACHINE TOOLS.
American Tool Works Co. (The)..........Cincinnati.
Bement, Miles & Co..........Philadelphia.
Manning, Maxwell & Moore..........New York.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W..........New York.

METALLIC PACKING.
Katzenstein, L. & Co..........New York.
Phenix Metallic Packing Co..........Chicago.
U. S. Metallic Packing Co..........Philadelphia.

METALS FOR BEARINGS.
Ajax Metal Co..........Philadelphia.
Cramp, Wm. & Sons..........Philadelphia.
Illinois Smelting & Refining Works..........Chicago.
Magnolia Metal Co..........New York.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co..........Boston, Mass.

MILLING MACHINES OF ALL KINDS.
American Tool Works Co. (The)..........Cincinnati.
Bement, Miles & Co..........Philadelphia.
Manning, Maxwell & Moore..........New York.

NAPHTHA LAUNCHES.
Gas Engine & Power Co..........New York.

NAUTICAL INSTRUMENTS.
Bliss, John & Co..........New York.
Ritchie & Sons, E. S..........Brookline, Mass.
Also most of the ship chandlers.

NAVAL ARCHITECTS.
Curr, Robert..........Cleveland.
Hillman, Gustav..........Brooklyn.
Kirby, Frank E..........Detroit.
Oldham, Joseph R..........Cleveland.
See, Horace..........New York.
Wood, W. J..........Chicago.

NICKEL STEEL FORGINGS.
Bethlehem Steel Co..........So. Bethlehem, Pa.

OAK, TIMBER AND PLANK.
Martin-Barriss Co..........Cleveland.

OILS AND LUBRICANTS.
Dixon Crucible Co., Jos..........Jersey City, N. J.
Standard Oil Co..........Cleveland.

PACKING.
Jenkins Bros..........New York.
Katzenstein, L. & Co..........New York.
Phenix Metallic Packing Co..........Chicago.
U. S. Metallic Packing Co..........Philadelphia.

PAINTS.
Baker, Howard H. & Co..........Buffalo.
Smith, Edward & Co..........New York.
Upson-Walton Co..........Cleveland.

PAINTING MACHINES, PNEUMATIC.
Chicago Pneumatic Tool Co..........Chicago.

PATENT ATTORNEYS.
Thurston & Bates..........Cleveland.

PIPE, WROUGHT IRON.
Bourne-Fuller Co..........Cleveland

PLANERS OF ALL KINDS.
American Tool Works Co. (The)..........Cincinnati.
Bement, Miles & Co..........Philadelphia.
Manning, Maxwell & Moore..........New York.

PLUMBING, MARINE.
Ellis Marine Plumbing Co..........New York.
Mott Iron Works, J. L..........New York.
Sands, Alfred B. & Son..........New York.
Kenney, The Co..........New York.

PNEUMATIC TOOLS.
Chicago Pneumatic Tool Co..........Chicago.
Manning, Maxwell & Moore..........New York.
Philadelphia Pneumatic Tool Co..........Philadelphia.
Q. & C. Co..........Chicago.

POCAHONTAS COAL.
Castner, Curran & Bullitt..........Philadelphia.

POLISH FOR METALS.
Bertram's Oil Polish Co..........Boston, Mass.

PROPELLER WHEELS.
American Ship Building Co..........Cleveland
Atlantic Works..........East Boston, Mass.
Bath Iron Works Ltd..........Bath, Me
Cramp, Wm. & Sons..........Philadelphia
Detroit Shipbuilding Co..........Detroit
Farrar & Trefts..........Buffalo
Fore River Engine Co..........Weymouth, Mass
Hyde Windlass Co..........Bath Me.
Harlan & Hollingsworth Co..........Wilmington, Del.
Hodge, S. F. & Co..........Detroit.
Jenks Ship Building Co..........Port Huron, Mich.
MacKinnon Mfg Co..........Bay City, Mich.
Maryland Steel Co..........Sparrow's Point, Md.
Moran Bros. Co..........Seattle, Wash.
Morse Iron Works & Dry Dock Co..........Brooklyn.
Neafie & Levy Ship & Eng. Bldg Co...Philadelphia.
Newport News Ship Bldg. Co..Newport News, Va.
Nixon, Lewis..........Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Pusey & Jones Co..........Wilmington, Del.
Sheriffs Mnfg. Co..........Milwaukee.
Trigg, Wm. R. Co..........Richmond, Va.
Trout, H. G..........Buffalo.
Union Iron Works..........San Francisco.
Wolff & Zwicker Iron Works..........Portland, Ore.

PROJECTORS, ELECTRIC.
General Electric Co..........Schenectady, N. Y.
Rushmore Dynamo Works..........Jersey City, N. J.
Sprague Electric Co..........New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co..........New York.
Davidson, M. T..........Brooklyn, N. Y.
Donohue & Co., John T..........Baltimore.
Kingsford Foundry & Machine Works..........Oswego, N. Y.
Van Duzen, The E. W. Co..........Cincinnati.
Worthington, Henry R..........New York.

PUNCHES, RIVETERS, SHEARS.
American Tool Works Co. (The)..........Cincinnati.
Bement, Miles & Co..........Philadelphia.
Cleveland Punch & Shear Works Co..........Cleveland.
Long & Allstatter Co..........Cincinnati.
Manning, Maxwell & Moore..........New York.
New Doty Mnfg. Co..........Janesville, Wis.
Philadelphia Pneumatic Tool Co..........Philadelphia.
Wood & Co., R. D..........Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register..........Chicago.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Aut. Releasing Hook Co..........New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co..........Cleveland

RIVETERS.
See punches, riveters and shears.

ROPE.
American Mnfg. Co..........New York
See also ship chandlers.

RUBBER INSULATED WIRES.
Roebling's Sons, John A..New York and Cleveland.

SAFETY VALVES.
American Steam Gauge Co..........Boston.
Ashton Valve Co..........Boston.
Consolidated Safety Valve Co..........New York.
Crosby Steam Gage & Valve Co..........Boston.

SAIL MAKERS.
Baker, Howard H. & Co..........Buffalo
Upson-Walton Co..........Cleveland.
Wilson & Silsby..........Boston.

SALVAGE COMPANIES.
See wrecking companies.

SCREW MACHINES.
American Tool Works Co. (The)..........Cincinnati.
Bement, Miles & Co..........Philadelphia.
Manning, Maxwell & Moore..........New York.

SEARCH LIGHTS.
General Electric Co..........Schenectady, N. Y.
Rushmore Dynamo Works..........Jersey City, N. J.
Sprague Electric Co..........New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

SEPARATORS, (CENTRIFUGAL).
Keystone Engine & Machine Works..Philadelphia.

SHAPERS.
American Tool Works Co. (The)..........Cincinnati.
Manning, Maxwell & Moore..........New York.

SHEARS.
See punches, riveters and shears.

SHEAVES, BALL BEARING.
Donohue & Co., John T..........Baltimore.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co..........Cleveland.

SHIP BUILDERS.
American Ship Building Co..........Cleveland.
Atlantic Works..........East Boston, Mass.
Bath Iron Works, Ltd..........Bath, Me.
Cramp, Wm. & Sons..........Philadelphia.
Craig Ship Building Co..........Toledo, O.
Chicago Ship Building Co..........Chicago.
Detroit Shipbuilding Co..........Detroit.
Fore River Engine Co..........Weymouth, Mass.
Harlan & Hollingsworth Co..........Wilmington, Del.
Iowa Iron Works..........Dubuque, Ia.
Jenks Ship Building Co..........Port Huron, Mich.
McWilliams, Frank..........1 Broadway, New York.
Maryland Steel Co..........Sparrow's Point, Md.
Moran Bros. Co..........Seattle, Wash.
Morse Iron Works & Dry Dock Co..........Brooklyn.
Neafie & Levy Ship & Eng. Bldg. Co..Philadelphia.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis..........Elizabeth, N. J.
Pusey & Jones Co..........Wilmington, Del.
Roach's Ship Yard..........Chester, Pa.
Townsend & Downey Ship Bldg. Co..........New York.
Trigg, Wm. R. Co..........Richmond, Va.
Union Dry Dock Co..........Buffalo.
Union Iron Works..........San Francisco.
Wolff & Zwicker Iron Works..........Portland, Ore.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

SHIP CHANDLERS.

Baker, Howard H. & Co. ... Buffalo.
Moran, Bros. Co. ... Seattle, Wash.
Upson-Walton Co. ... Cleveland.

SLING FRAME FOR HANDLING BARRELS.

Patriarche, H. R. ... Milwaukee.

SPARS—LARGE SIZES.

Moran Bros. Co. ... Seattle, Wash.

STAYBOLT IRON, HOLLOW AND SOLID.

Falls Hollow Staybolt Co. ... Cuyahoga Falls, O.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line ... New York.
International Nav. Co. ... Philadelphia.
Red Star Line ... New York.

STEAM VESSEL FOR SALE.

Holmes, Samuel ... New York.

STEEL SHAFTS, SOLID OR HOLLOW.

Bethlehem Steel Co. ... So. Bethlehem, Pa.

STEERING APPARATUS.

American Ship Building Co. ... Cleveland.
Chase Machine Co. ... Cleveland.
Detroit Shipbuilding Co. ... Detroit.
Donohue & Co., John T. ... Baltimore.
Hyde Windlass Co. ... Bath, Me.
Jenks Ship Building Co. ... Port Huron, Mich.
Queen City Engineering Co. ... Buffalo.
Sheriffs Mfg. Co. ... Milwaukee.
Williamson Bros. ... Philadelphia.

STOKERS FOR MARINE SERVICE.

American Stoker Co. ... New York.

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co. ... Cleveland.

STOCKLESS ANCHORS.

Baldt Anchor Co. ... Chester, Pa.
International Anchor Co. ... Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.

Berlin Iron Bridge Co. ... East Berlin, Conn.

SURVEYORS, MARINE.

Curr, Robert ... Cleveland.
Gibbs & Joys ... Milwaukee.
Oldham, Joseph R. ... Cleveland

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son ... New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co. ... Chicago.
Pittsburgh Testing Laboratory, Ltd. ... Pittsburgh.

THRUST COLLARS FOR PROPELLER SHAFTS.

Ball Bearing Co. ... Boston, Mass.

TIMBER—LARGE PIECES.

Moran Bros. Co. ... Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

American Tool Works Co. (The) ... Cincinnati.
Bement, Miles & Co. ... Philadelphia.
Chicago Pneumatic Tool Co. ... Chicago.
Cleveland Punch & Shear Works Co. ... Cleveland.
Long & Allstatter, The Co. ... Hamilton, O.
Manning, Maxwell & Moore ... New York.
New Doty Mnfg. Co. ... Janesville, Wis.
Philadelphia Pneumatic Tool Co. ... Philadelphia.
Q. & C. Co. ... Chicago.
Wood & Co., R. D. ... Philadelphia.

TRUCKS.

Boston & Lockport Block Co. ... Boston, Mass.

TOWING MACHINES.

American Ship Windlass Co. ... Providence, R. I.
Chase Machine Co. ... Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. ... Kingston, Ont.
Swain Wrecking Co. ... Detroit.

TUBING, STEEL, COPPER AND BRASS.

Atlantic Tube Co. ... Pittsburg.
Hungerford Brass & Copper Co., U. T. ... New York.
Merchant & Co., Inc. ... Philadelphia.
Shelby Steel Tube Co. ... Cleveland.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. ... Boston.
Ashton Valve Co. ... Boston.
Crosby Steam Gage & Valve Co. ... Boston.
Jenkins Bros. ... New York.
Manning, Maxwell & Moore ... New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.

Smith, Edward & Co. ... New York.

VARNISH PAINT.

Mair, John & Son ... Philadelphia.

VESSEL AND FREIGHT AGENTS.

Bartow, J. H. ... Cleveland.
Boland, John J. ... Buffalo.
Brown & Co. ... Buffalo.
Drake & Maytham ... Buffalo.
Elphicke, C. W. & Co. ... Chicago.
Gibbs & Joys ... Milwaukee.
Hall & Root ... Buffalo.
Hawgood & Moore ... Cleveland.
Holmes, Samuel ... New York.
Hutchinson & Co. ... Cleveland.
Keith, J. G. & Co. ... Chicago.
Miller, Bull & Knowlton ... New York.
Mitchell & Co. ... Cleveland.
Myers, James A. ... Chicago.
Pauly, H. J. ... Milwaukee.
Richardson, W. C. ... Cleveland.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co. ... Buffalo.
Sprague Electric Co. ... New York.
Sturtevant Co., B. F. ... Boston.

WIRE ROPE.

American Steel & Wire Co. ... Chicago.
Baker, H. H. & Co. ... Buffalo.
Roebling's Sons, John A. ... New York and Cleveland.
Upson-Walton Co. ... Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co. ... Boston.
Ashton Valve Co. ... Boston.
Crosby Steam Gage & Valve Co. ... Boston.

WINDLASSES.

American Ship Windlass Co. ... Providence, R. I.
American Ship Building Co. ... Cleveland.
Hyde Windlass Co. ... Bath, Me.
Jenks Ship Building Co. ... Port Huron, Mich.

WINCHES.

American Ship Windlass Co. ... Providence, R. I.
Hyde Windlass Co. ... Bath, Me.

WOOD WORKING MACHINERY.

Woods Machine Co., S. A. ... So. Boston.

WORM GEARING.

Morse, Williams & Co. ... Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. ... Kingston, Ont.
Playfair's Barge & Tug Line ... Midland, Ont.
Salvage Association of No. America ... Chicago.
Swain Wrecking Co. ... Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson & Silsby ... Boston.
See also ship chandlers.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son ... Wilmington, Del.
Gas Engine & Power Co. ... New York.
Lane & DeGroot ... Brooklyn.

YAWLS.

Drein, Thos. & Son ... Wilmington, Del.
Lane & DeGroot ... Brooklyn.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

Ajax Metal Co. ... 36
Almy Water Tube Boiler Co. ... 9
American Line ... 27
American Mnfg. Co. ... 23
American Ship Building Co. ... 1
American Ship Windlass Co. ... 2
American Steam Gauge Co. ... 1
American Steel & Wire Co. ... 1
American Stoker Co. ... 3
American Tool Works Co. ... 21
Armstrong Cork Co. ... 36
*Ashcroft Mnfg. Co. ... 8
Ashton Valve Co. ... 10
Atlantic Works ... 5
Atlantic Tube Co. ... 25

Babcock & Wilcox Co. ... 9
Baldt Anchor Co. ... 7
Ball Bearing Co., Boston, Mass. ... 1
Baker, Howard H. & Co. ... 7
Bartow, J. H. ... 26
Bath Iron Works, Ltd. ... 1
Bement, Miles & Co. ... 3
Berlin Iron Bridge Co. ... 6
Bertram's Oil Polish Co. ... 1
Bessemer Steamship Co. ... 28
Bethlehem Steel Co. ... 6
Blake, Geo. F., Mnfg. Co. ... 7
*Bliss, John & Co. ... 31
*Bloomsburg & Co., H. ... 29
Boland, J. J. ... 26
*Boston & Lockport Block Co. ... 36
*Boyer Water Tube Boiler Co. ... 29
Bourne-Fuller Co. ... 10
Brown & Co. ... 26
Brown Hoist'g & Convey'g Mach Co ... 2
Buffalo Forge Co. ... 10

Castner, Curran & Bullitt ... 30
Chase Machine Co. ... 6
Chelsea Clock Co. ... 35
*Chicago Pneumatic Tool Co. ... 29
Chicago Ship Building Co. ... 2
*Cleveland Punch & Shear Wks. Co. ... 31
C. C. C. & St. L. R. R. ... 35
Conners, W. J. ... 26
Cole & Kuhls ... 27
*Consolidated Safety Valve Co. ... 8
Continental Iron Works ... 2
Cory, Chas. & Son ... 8
*Craig Ship Building Co. ... 31
Cramp, Wm., & Sons, S. & E. B. Co. ... 1
Crosby Steam Gage & Valve Co. ... 10
Crowl, Samuel H. ... 26
Curr, Robert ... 26

Dallett, Thos. H. & Co. ... 8
Davidson, M. T. ... 7
*Dearing Water Tube Boiler Co. ... 24
Delauney, Belleville & Co. ... 22
Detroit Shipbuilding Co. ... 1
Detroit Screw Works ... 9
Dearborn Drug & Chemical Works. ... 31
Delaware River Iron S. B. & E. Wks ... 5
Dixon, Jos., Crucible Co. ... 7
Donnelly Salvage & Wrecking Co. ... 28
Donohue & Co., John T. ... 30
Drake & Maytham ... 26
Drein, Thos. & Son ... 9

Ellis Marine Plumbing Co. ... 27
Elphicke, C. W. & Co. ... 26

Farrar & Trefts ... 4
Falls Hollow Staybolt Co. ... 4
Fletcher, W. & A. Co. ... 5
Fore River Engine Co. ... 5
Fogg, M. W. ... 29

Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated ... 29
General Electric Co. ... 6
Gibbs & Joys ... 26
Giddings & Stevens ... 4
Gilchrist, Albert J. ... 26
Goulder, Harvey D. ... 26
Graham, James & Co. ... 30
Great Lakes Register ... 27

Hall & Root ... 26
Hall Compound Feeder Co. ... 27
Hanna, M. A. & Co. ... 28
Hanlon, Mark H. ... 30
Harlan & Hollingsworth Co., The ... 5
Hawgood & Moore ... 26
*Hayden & Derby Mnfg. Co. ... 8
Herriman, F. D. ... 27
Hillman, Gustav ... 26
Hodge, S. F. & Co. ... 25
Holmes, Samuel ... 26
Hoyt, Dustin & Kelley ... 26
Hungerford Brass & Copper Co., U. T. ... 3
Hunt, Robert W. & Co. ... 26
Hutchinson & Co. ... 26
Hyde Windlass Co. ... 36

Illinois Smelting & Refining Works. ... 36
Ingersoll-Sergeant Drill Co. ... 28
International Anchor Co. ... 7
International Navigation Co. ... 27
Iowa Iron Works ... 5

Jenkins Brothers ... 8-10
Jenks Ship Building Co. ... 35

Kahnweiler's Sons, David ... 4
Katzenstein, L. & Co. ... 4
*Kenney Co., The ... 23
Keith, J. G. & Co. ... 26
Keystone Engine & Machine Works ... 6
Kingsford Foundry & Mach. Works ... 31

Lane & DeGroot ... 9
*Learmonth, Robert ... 31
Lebanon Chain Works ... 5
Lidgerwood Mfg. Co. ... 6
Long & Allstatter Co. ... 23
L. S. & M. S. Ry ... 33

McMyler Mfg. Co. ... 4
McWilliams, Frank ... 5
*Magnolia Metal Co. ... 1
MacKinnon Mfg. Co. ... 25
Mair, John & Son ... 6
Manning, Maxwell & Moore ... 3
Manzel Bros. ... 29
Marine Iron Co. ... 4
Martin-Barriss Co. ... 7
Maryland Steel Co. ... 5
Miller, Bull & Knowlton ... 26
Miller, Walter ... 7
Mitchell & Co. ... 26
Monongahela Iron & Steel Co. ... 3
*Moran Bros. Co. ... 35
Morse Iron Works & Dry Dock Co. ... 4
Morse, Williams & Co. ... 7
Mott Iron Works, J. L. ... 8
Myers, James A. ... 26

Neafie & Levy Ship & Eng. Bldg. Co. ... 5
Newport News Ship Building & Dry Dock Co. ... 5
New Doty Mfg. Co. ... 10
Nixon, Lewis ... 5
North River Iron Works ... 5

Oldham, J. R. ... 26
Osborne & Co., F. H. ... 26
Osborne, Saeger & Co. ... 30

Page Bros. & Co. ... 4
Parker, A. A. & Bro. ... 27
Pauly, H. J. ... 26
Patriarche, H. R. ... 10
Peck, Chas. E. & W. F. ... 27
*Penberthy Injector Co. ... 35
Phenix Metallic Packing Co. ... 25
Philadelphia Pneumatic Tool Co. ... 8
Phosphor Bronze Smelting Co. Ltd. ... 7
Pickands, Mather & Co. ... 28
Pinney, Orestes C. ... 26
Pittsburgh & Chicago Gas Coal Co. ... 30
Pittsburgh Testing Laboratory, Ltd ... 26
Playfair's Barge & Tug Line ... 36
Port Royal Dock Co. ... 30
Powell, Ambrose V. ... 26
Pusey & Jones Co. ... 5

Q. & C. Co. ... 23
Queen City Engineering Co. ... 8

Richardson, W. C. ... 26
*Ritchie & Sons, E. S. ... 31
Roach's Ship Yard ... 5
Roberts Water Tube Boiler Co. ... 9
Red Star Line ... 27
*Roebling's, John A. Sons Co. ... 36
Rochester & Pittsburgh Coal & Iron Co. ... 30
Rushmore Dynamo Works ... 6

Safety Car Heating & Lighting Co. ... 29
Salvage Association of No. America ... 27
Sands, Alfred B. & Son ... 8
Scherzer Rolling Lift Bridge Co. ... 6
See, Horace ... 26
Shelby Steel Tube Co. ... 25
Sheriffs Mfg. Co. ... 8
Simpson, Geo. A. ... 22
Smith, Edward, & Co. ... 1
Smith, Stanley B. & Co. ... 30
Standard Automatic Releasing Hook Co. ... 4
Standard Oil Co. ... 27
Sterling Lubricator Co. ... 25
Stirling Co. ... 9
Sturtevant, B. F. Co. ... 36
Swain Wrecking Co. ... 28

Thurston & Bates ... 26
Townsend & Downey Ship Bldg. Co. ... 4
Trigg Co., Wm. R. ... 3
Trout, H. G. ... 7
Union Dry Dock Co. ... 2

Union Iron Works ... 5
Upson-Walton Co. ... 36
U. S. Metallic Packing Co. ... 36

Van Duzen Co., The E. W. ... 7

Watson, Egbert P. ... 9
Webster, Camp & Lane Machine Co. ... 3
Westinghouse Electric & Mfg. Co. ... 6
White, Johnson, McCaslin & Cannon ... 26
Williamson Bros. ... 29
Wilson, Thomas ... 26
Wilson & Silsby ... 6
Wolff & Zwicker Iron Works ... 5
Wood, W. J. ... 26
*Wood & Co., R. D. ... 31
Woods Machine Co., S. A. ... 25
Worthington, Henry R. ... 7
Wright, Herbert & Co. ... 26

Youghiogheny & Lehigh Coal Co. ... 30

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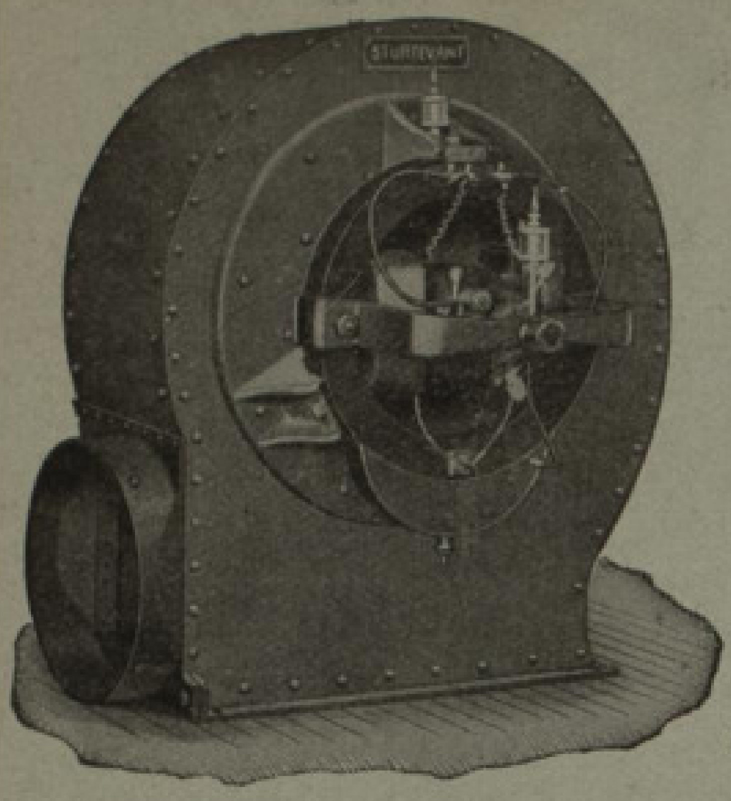

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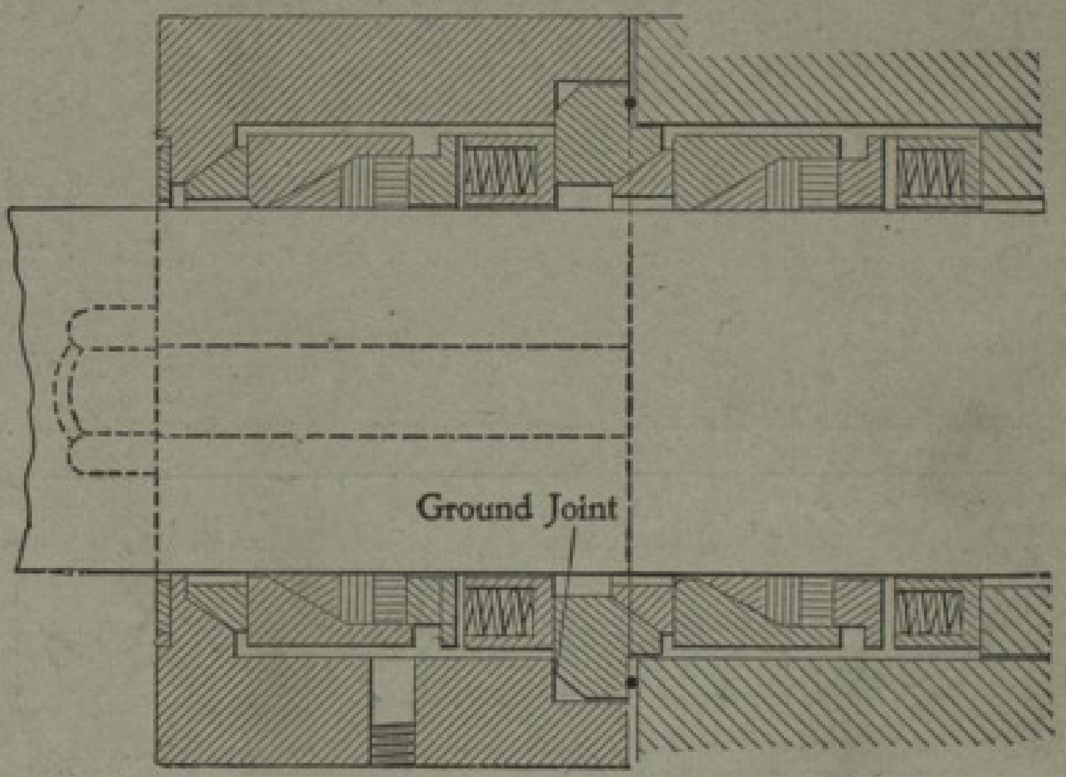

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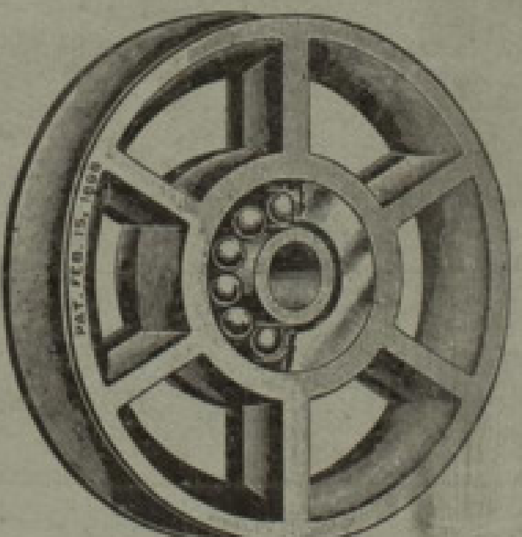

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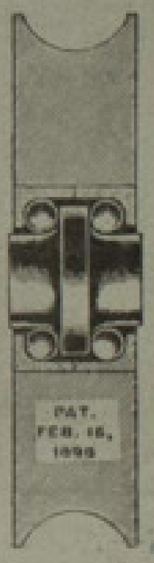

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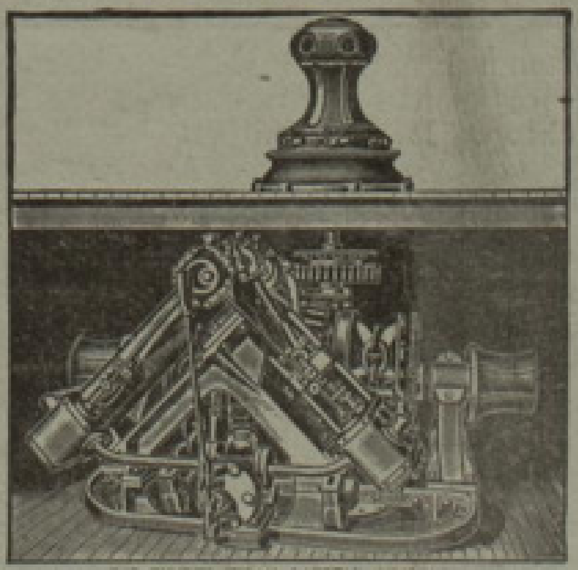

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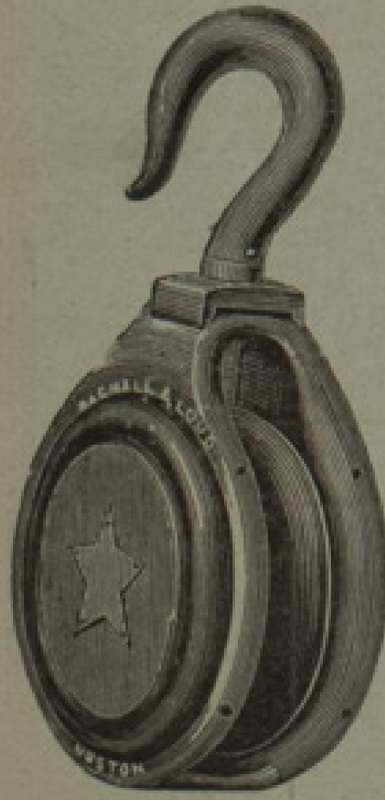

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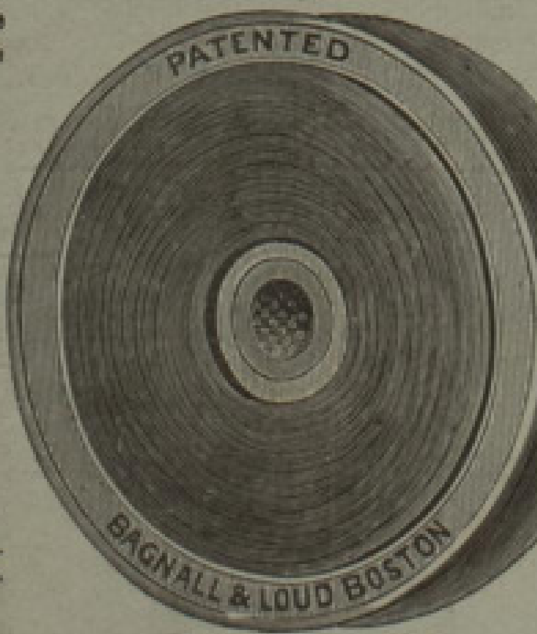

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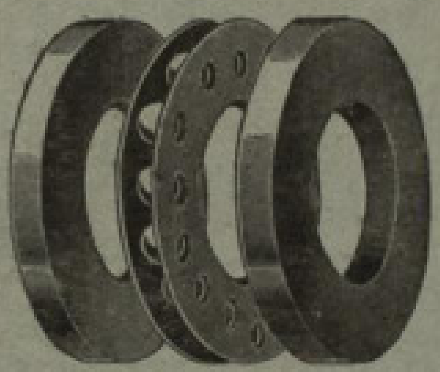

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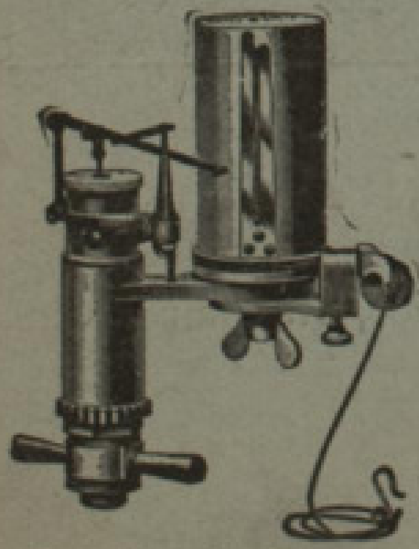

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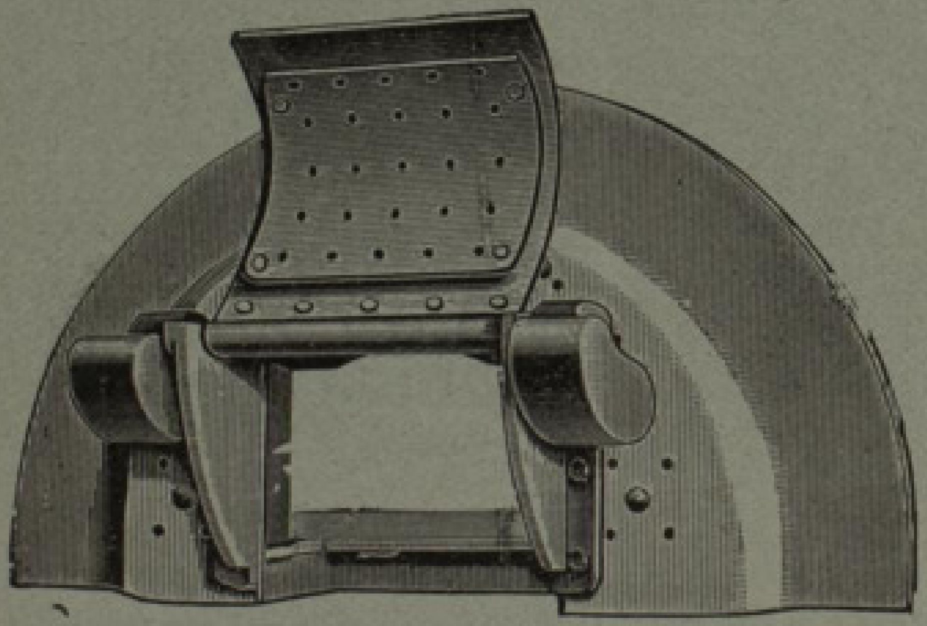

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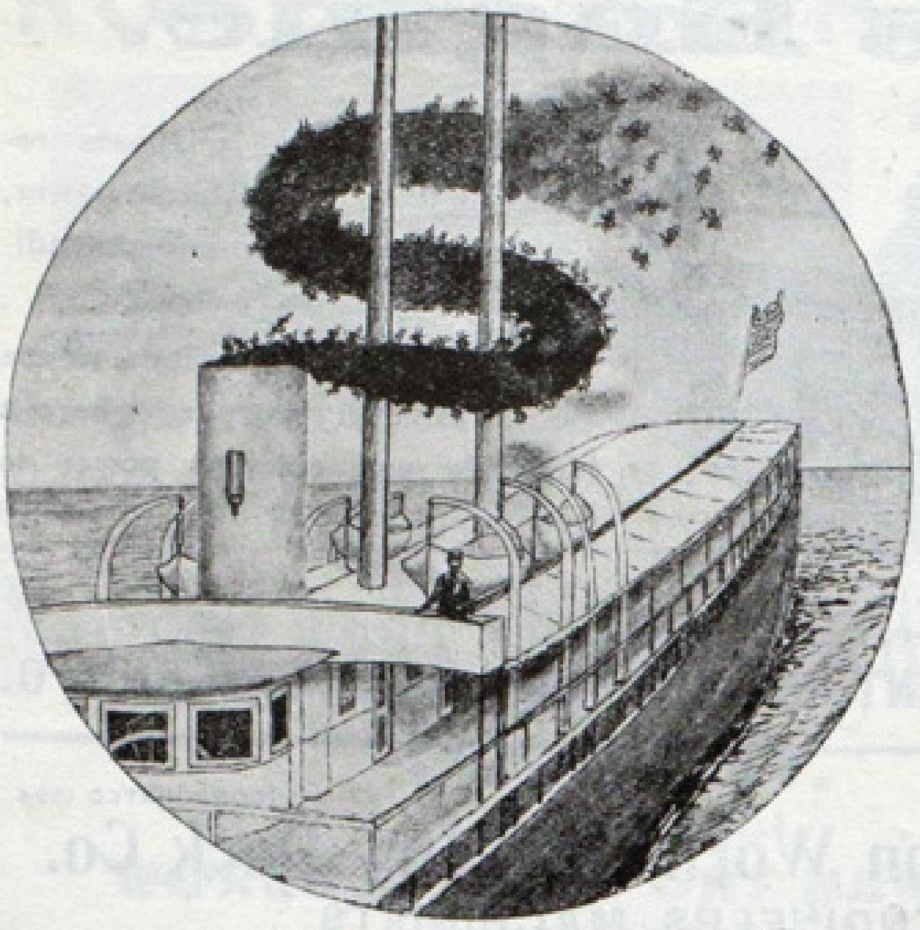

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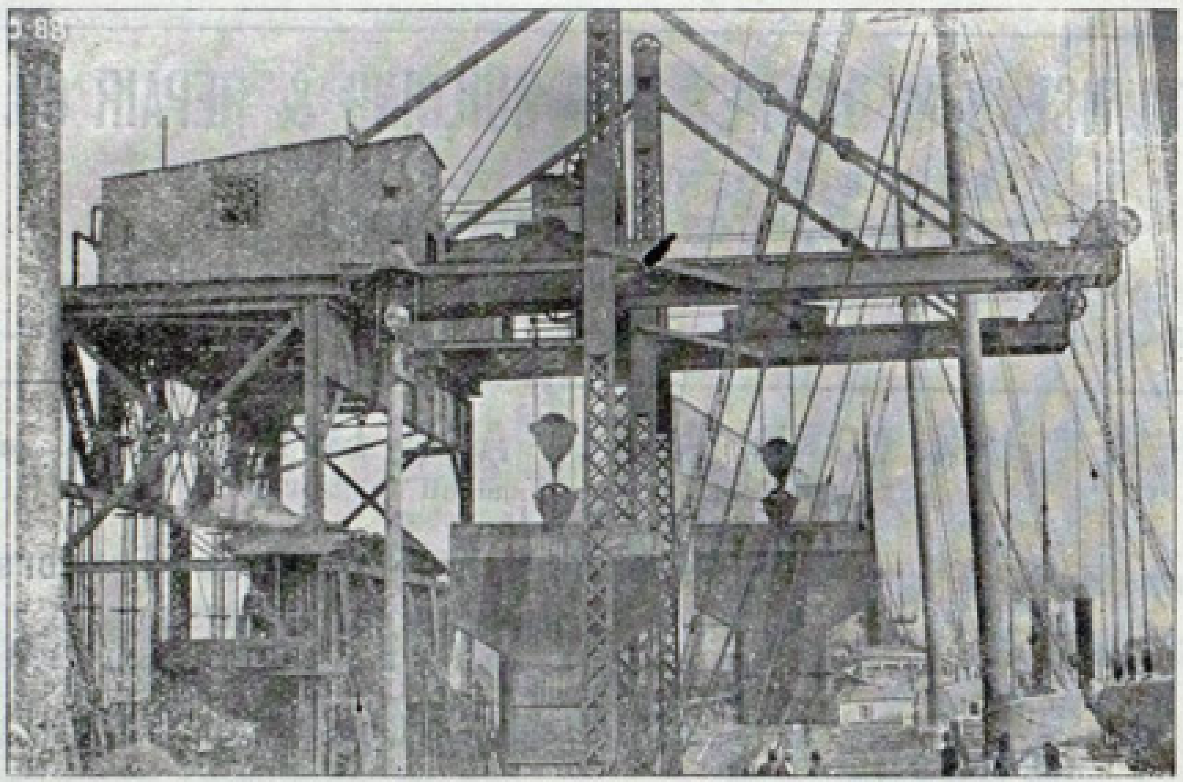

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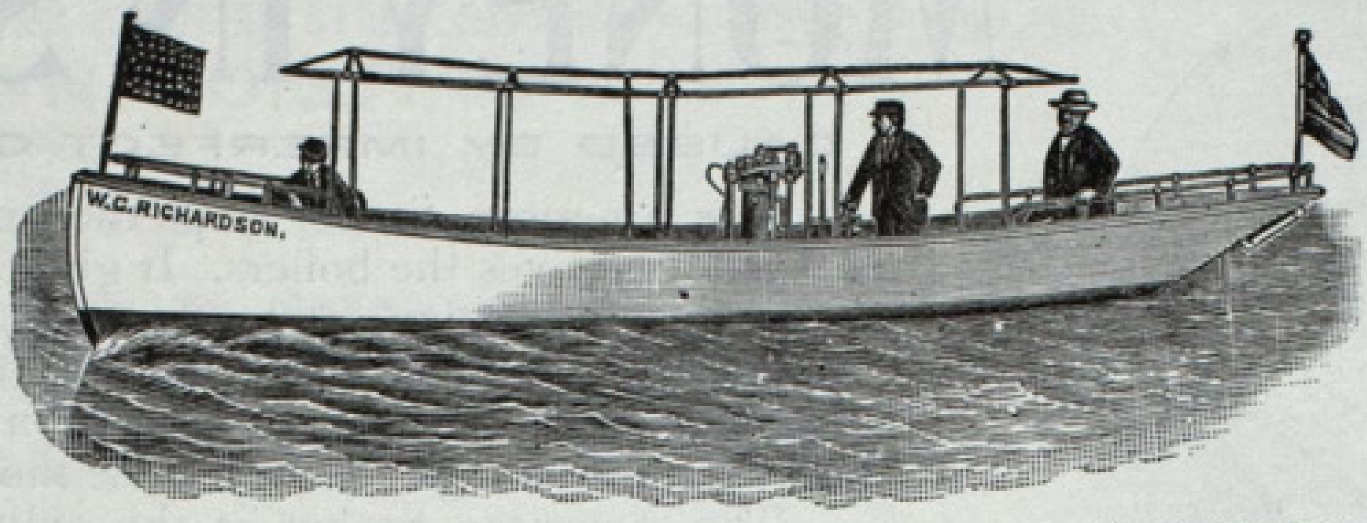
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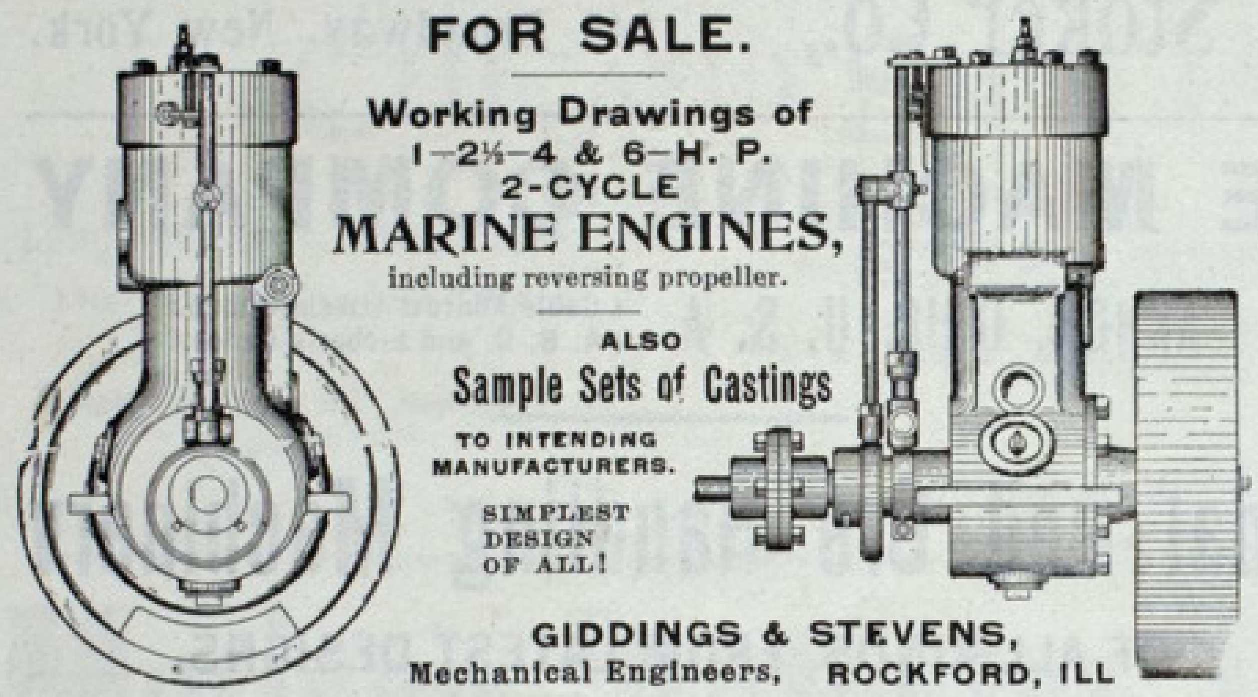

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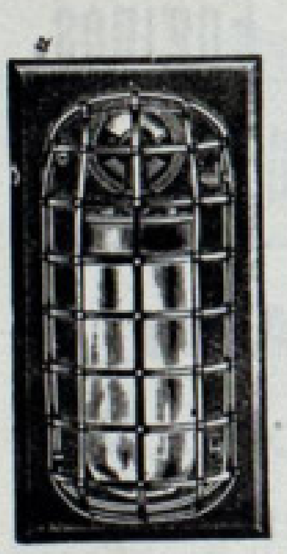

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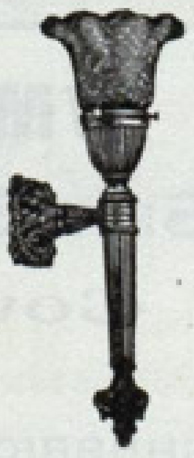

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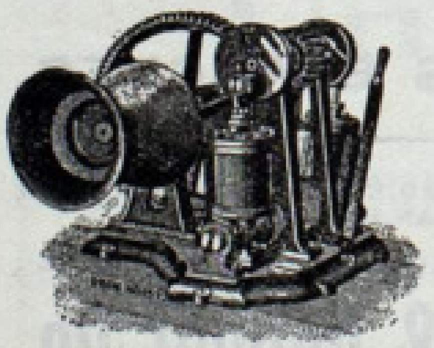

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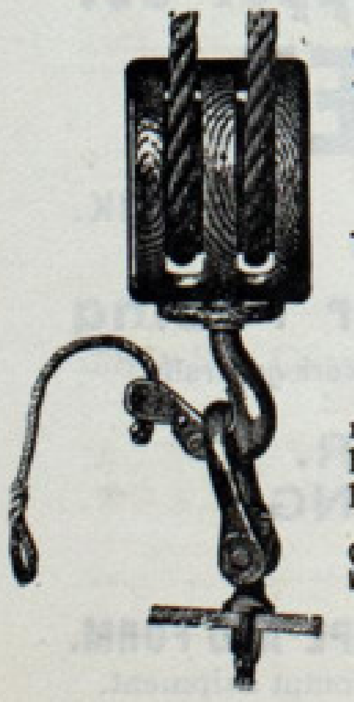

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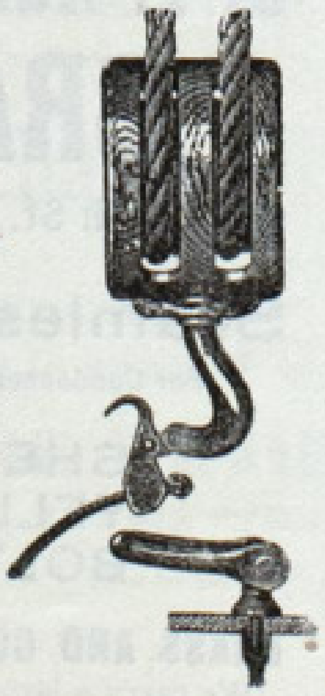

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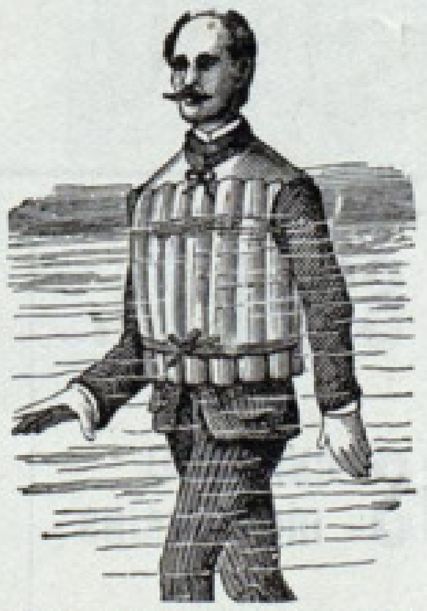

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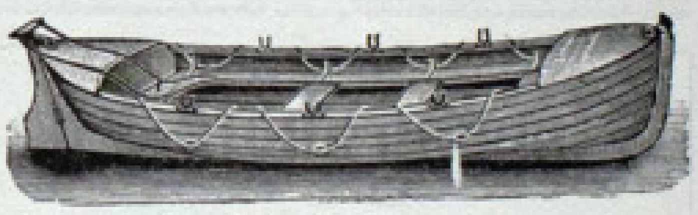

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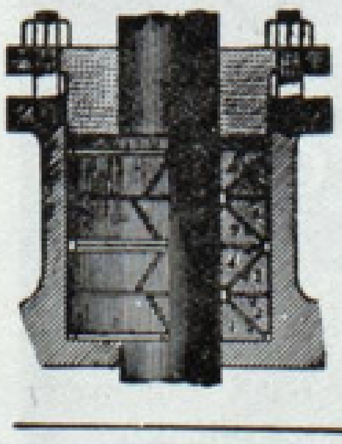

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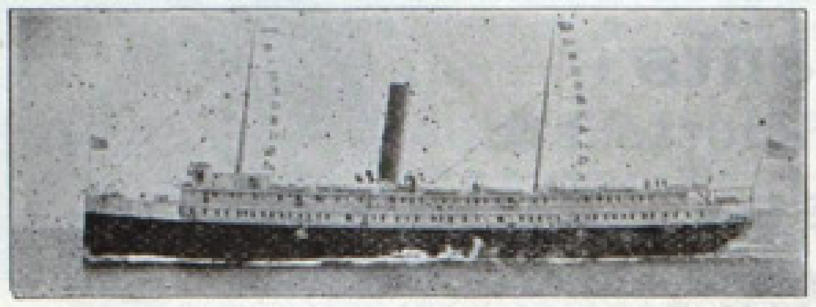

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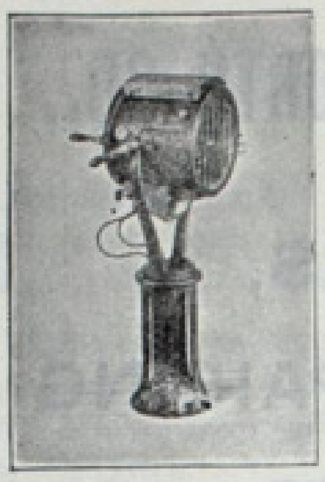

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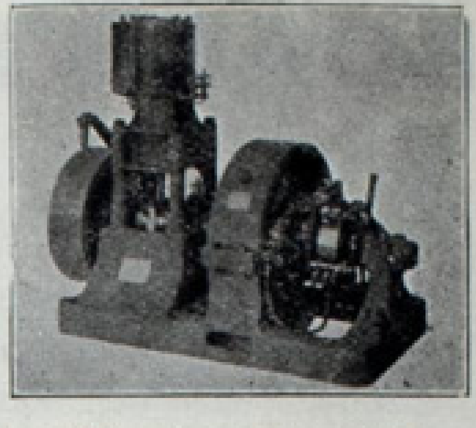

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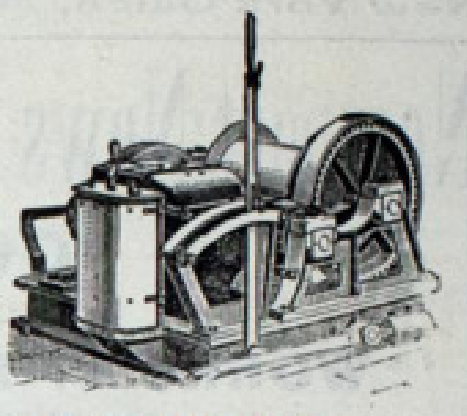

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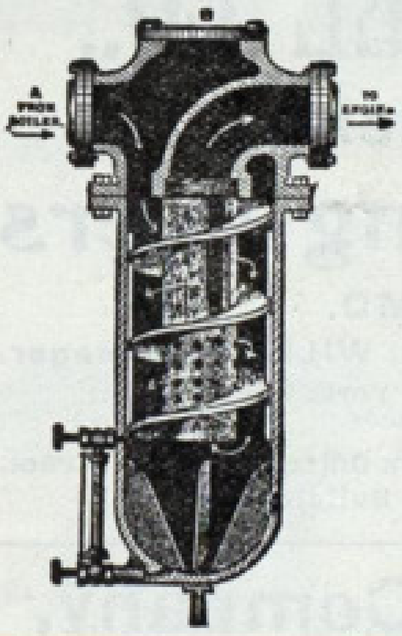

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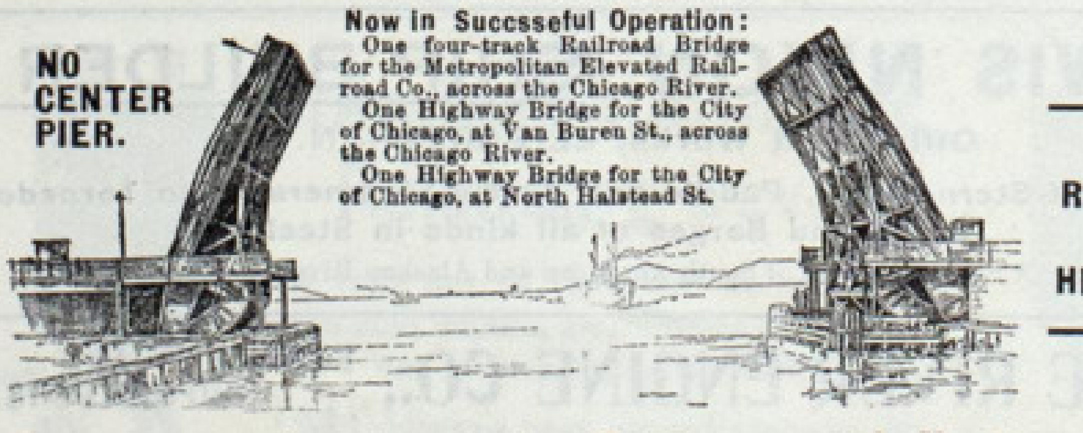

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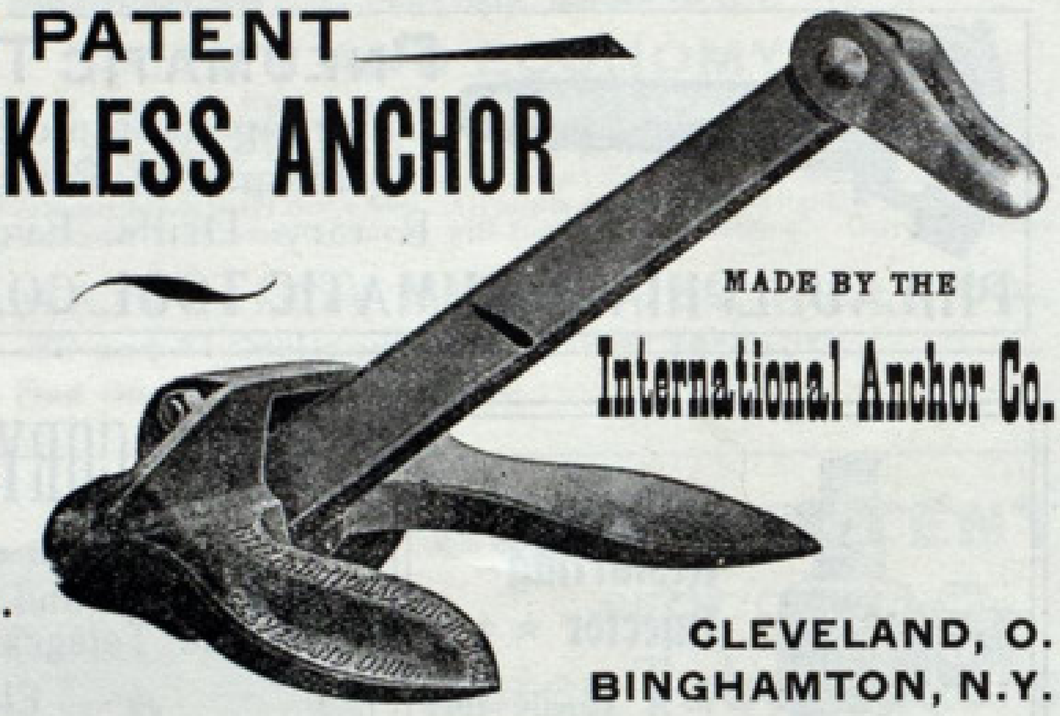

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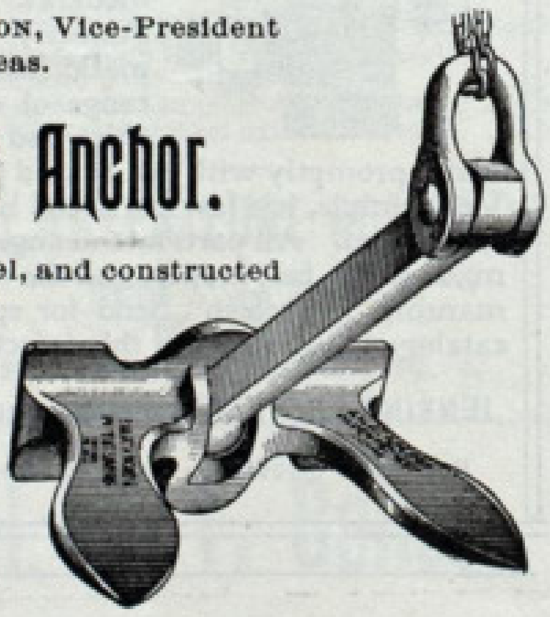

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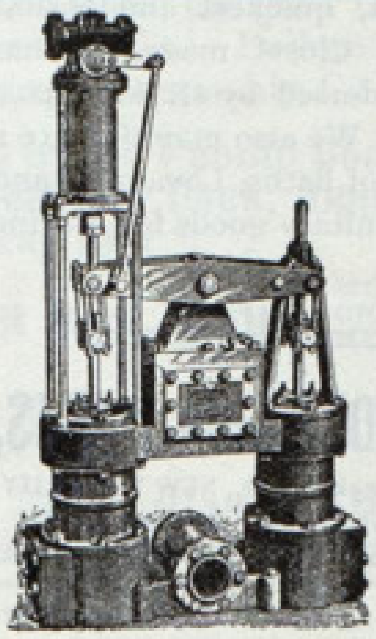

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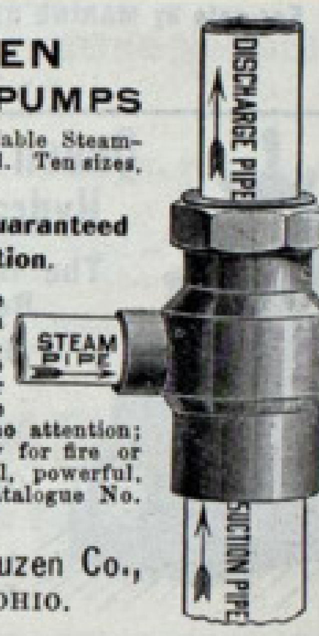

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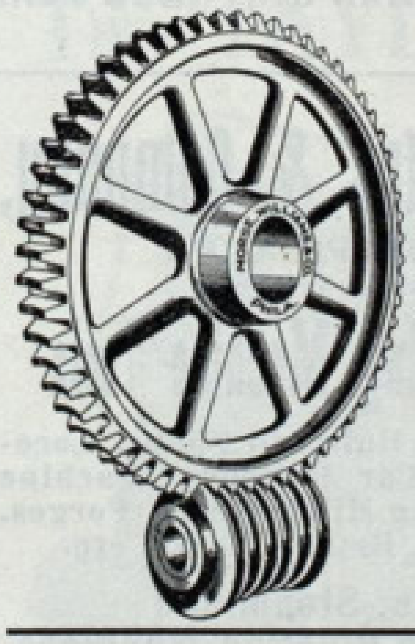
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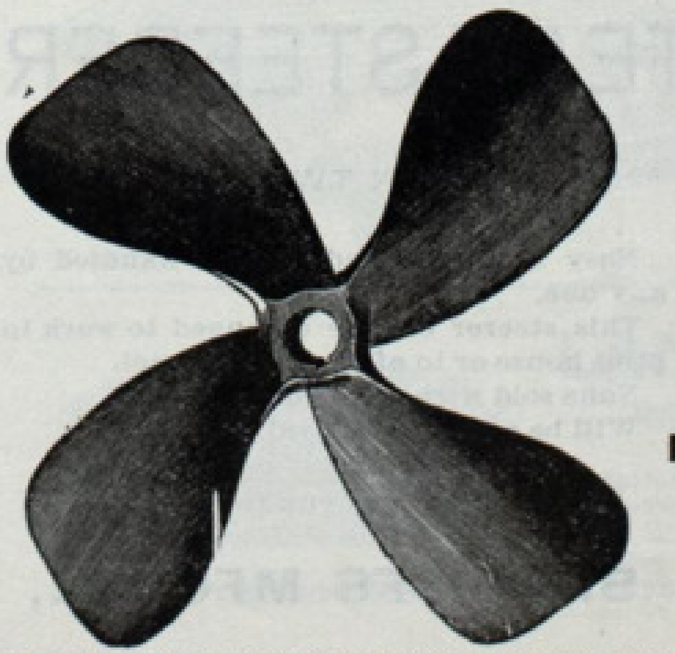

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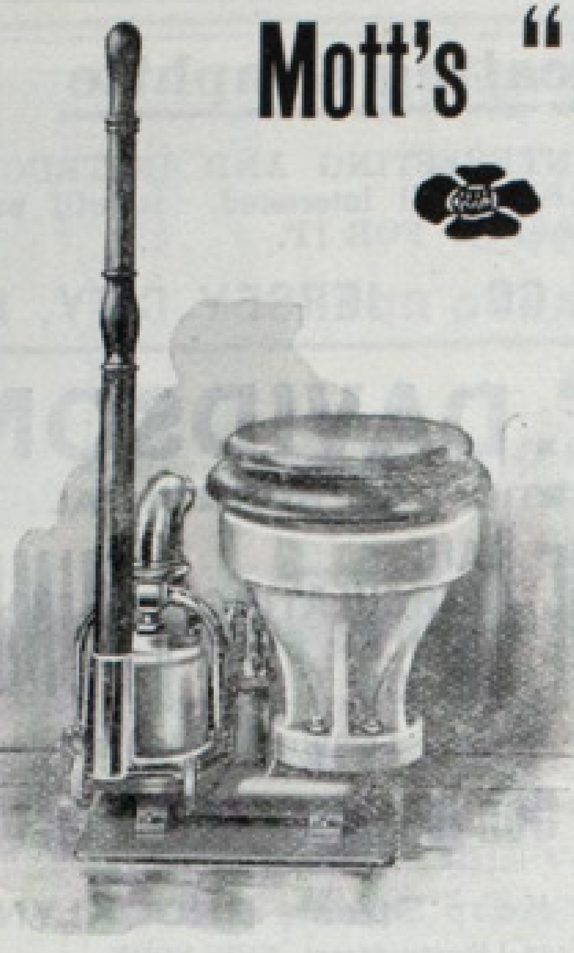

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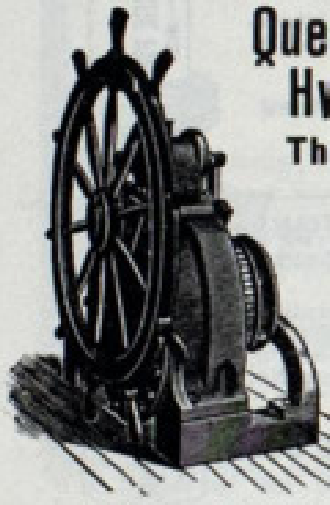

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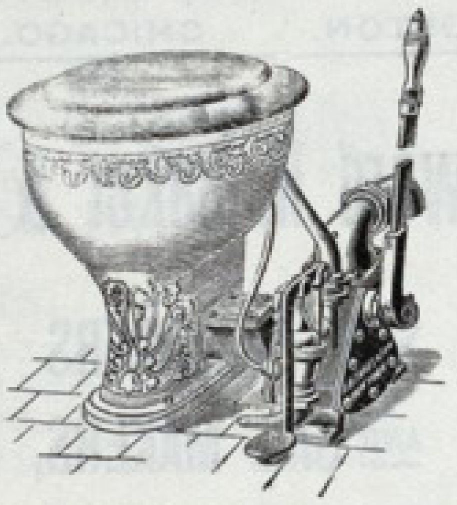

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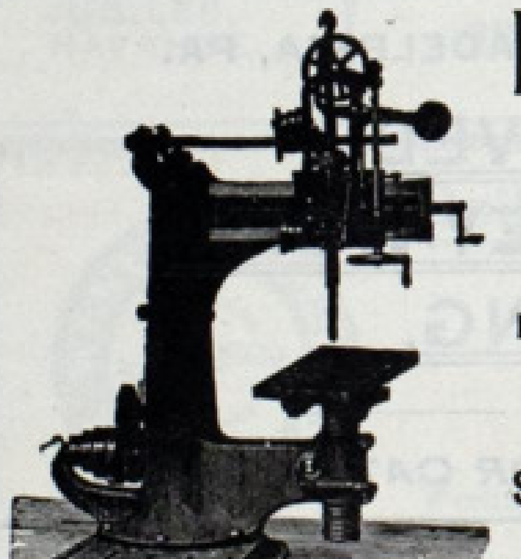

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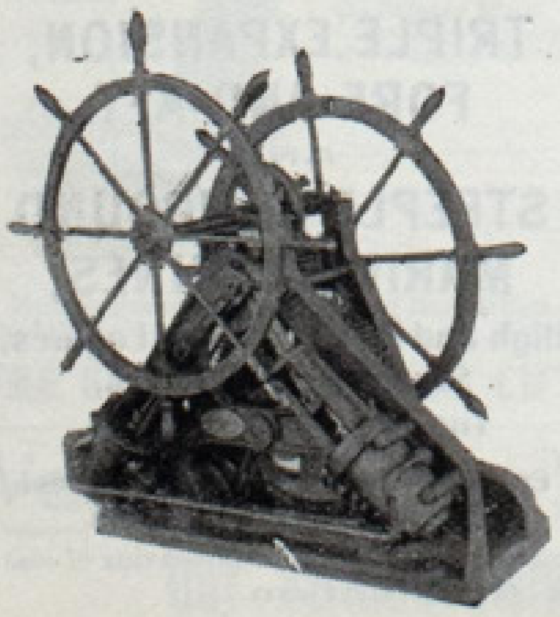

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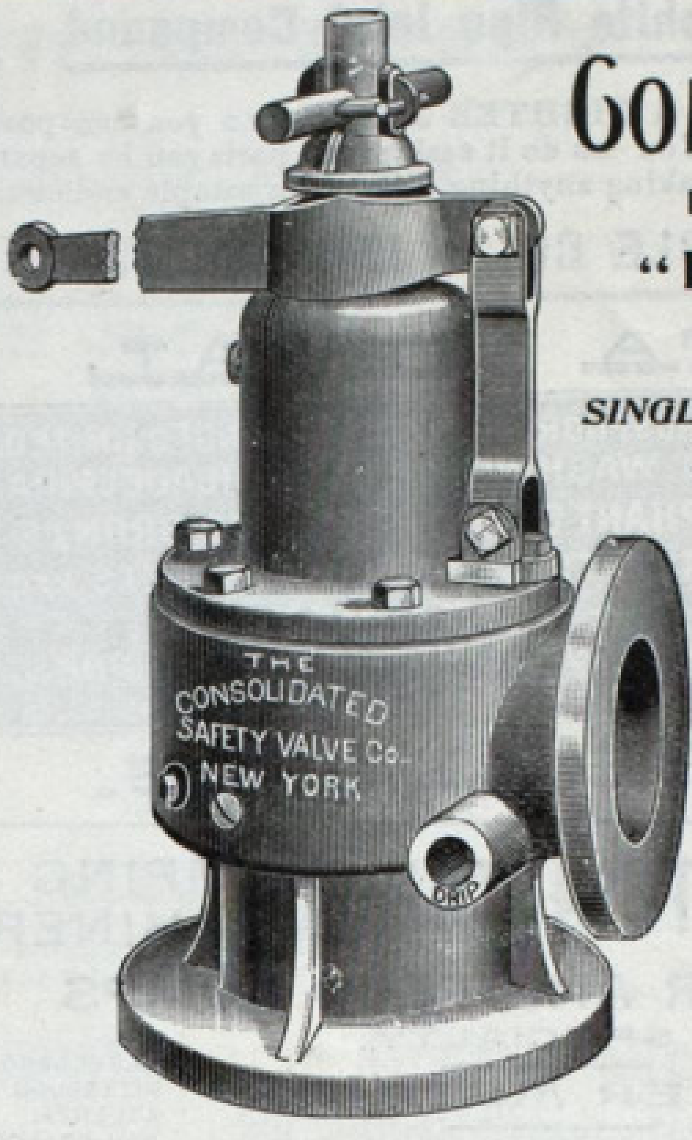

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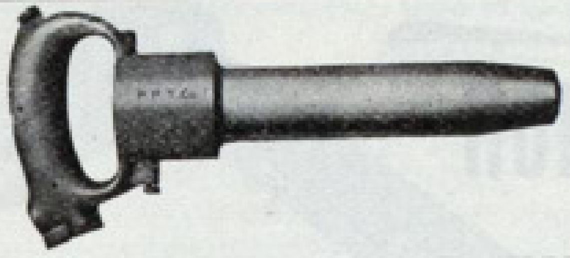

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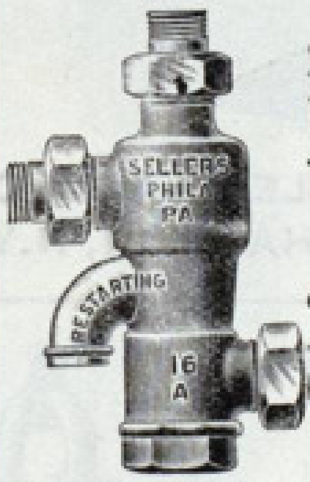

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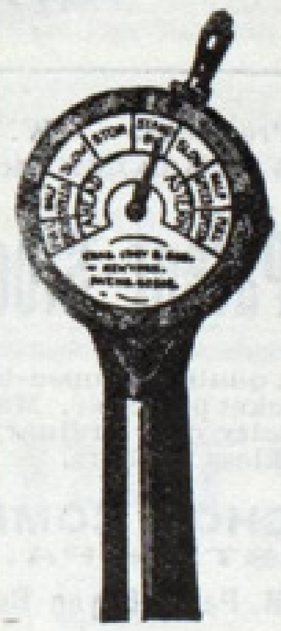

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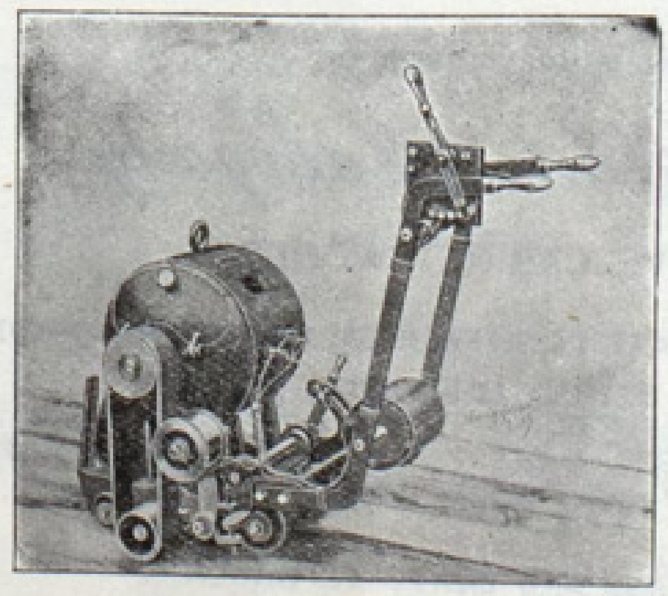

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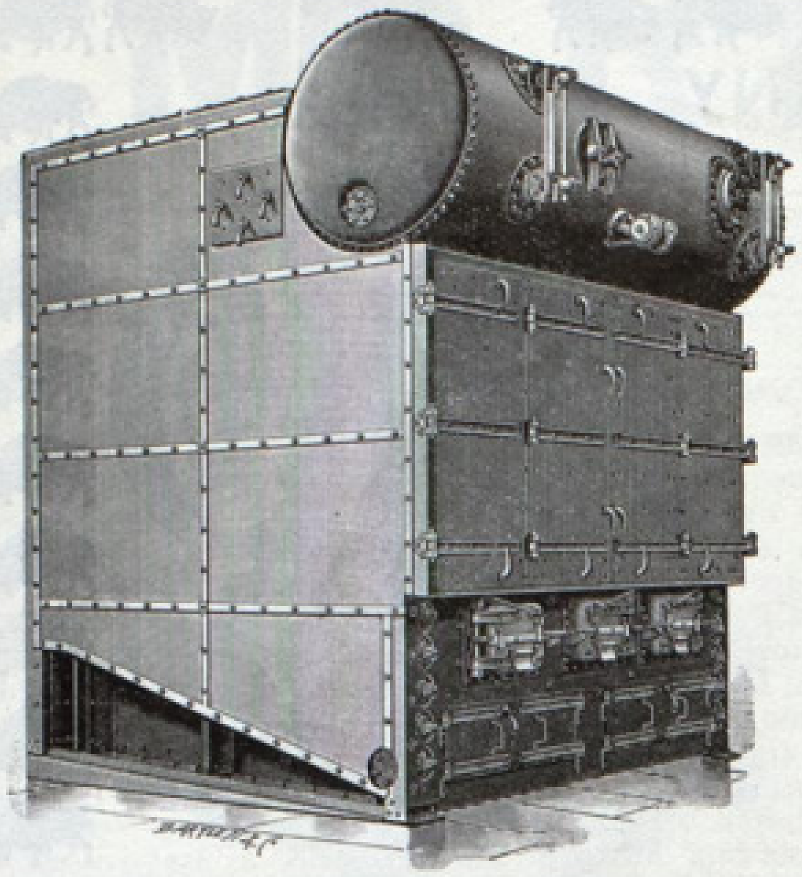

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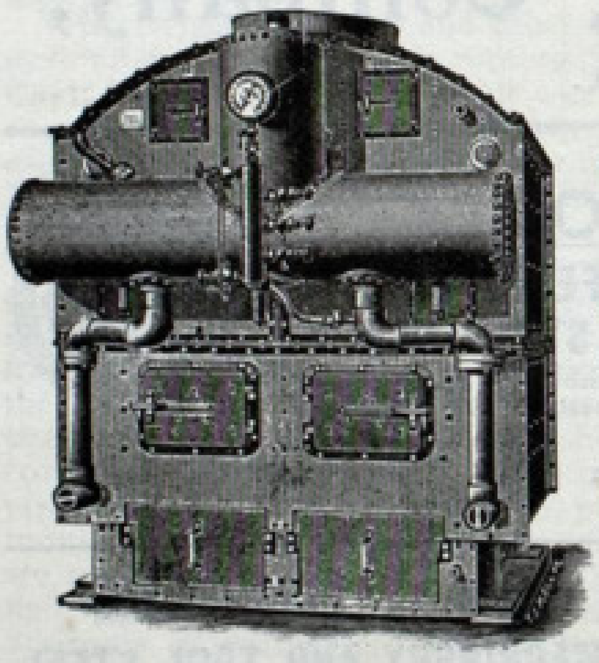

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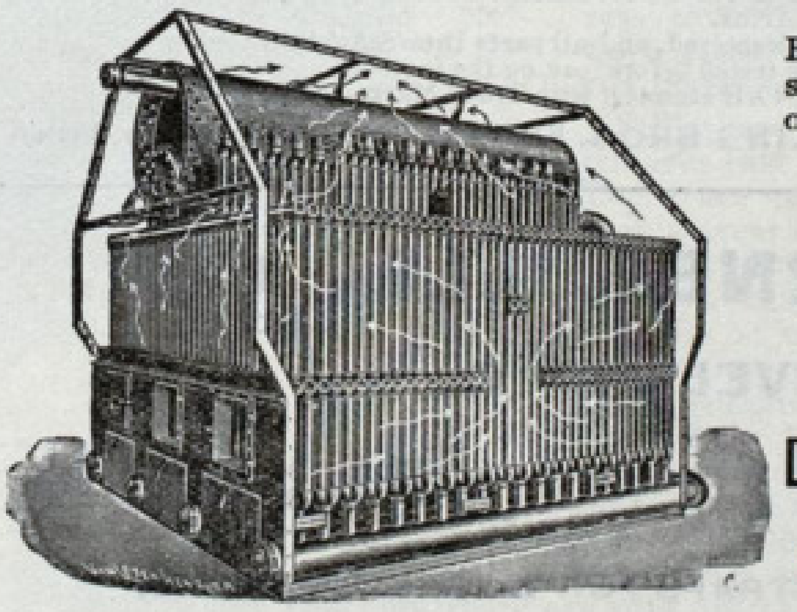

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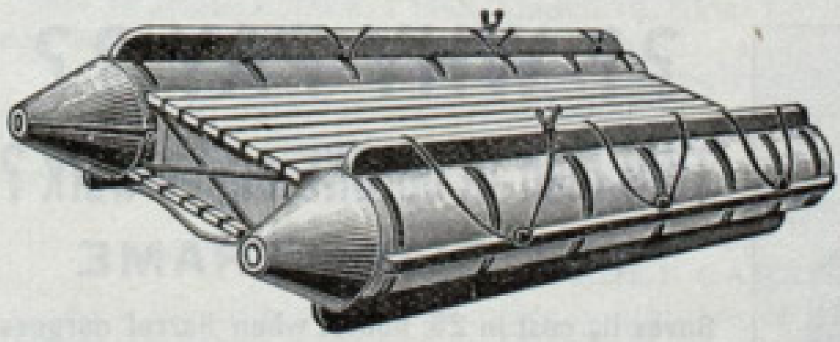

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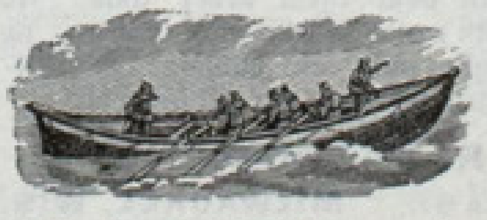

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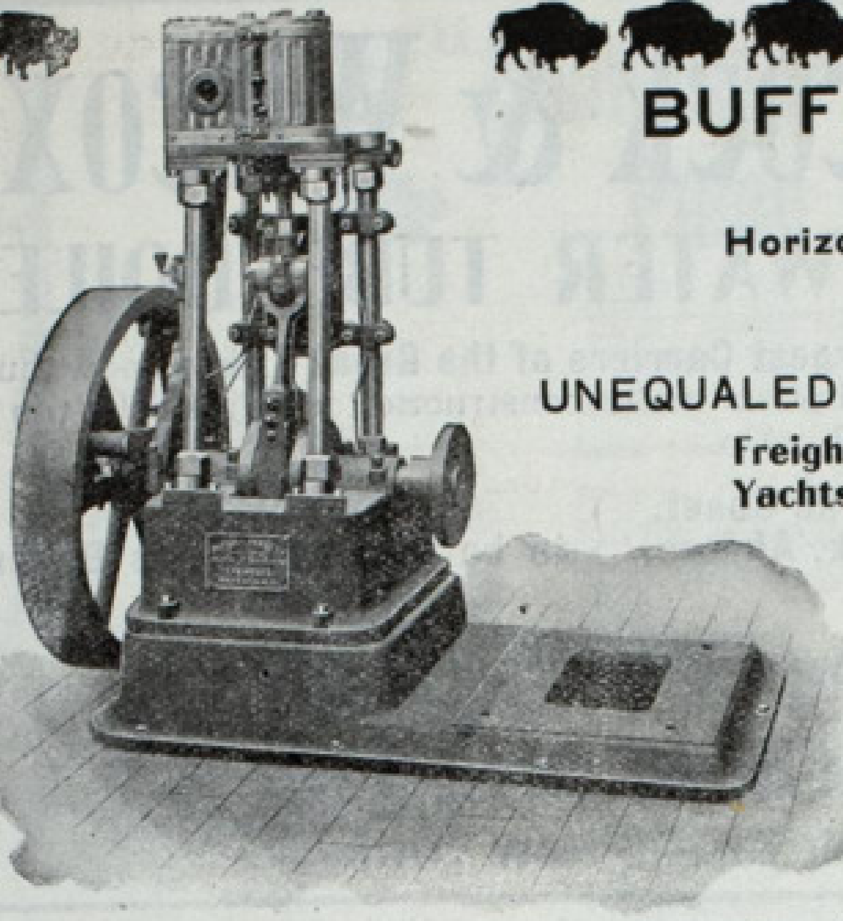
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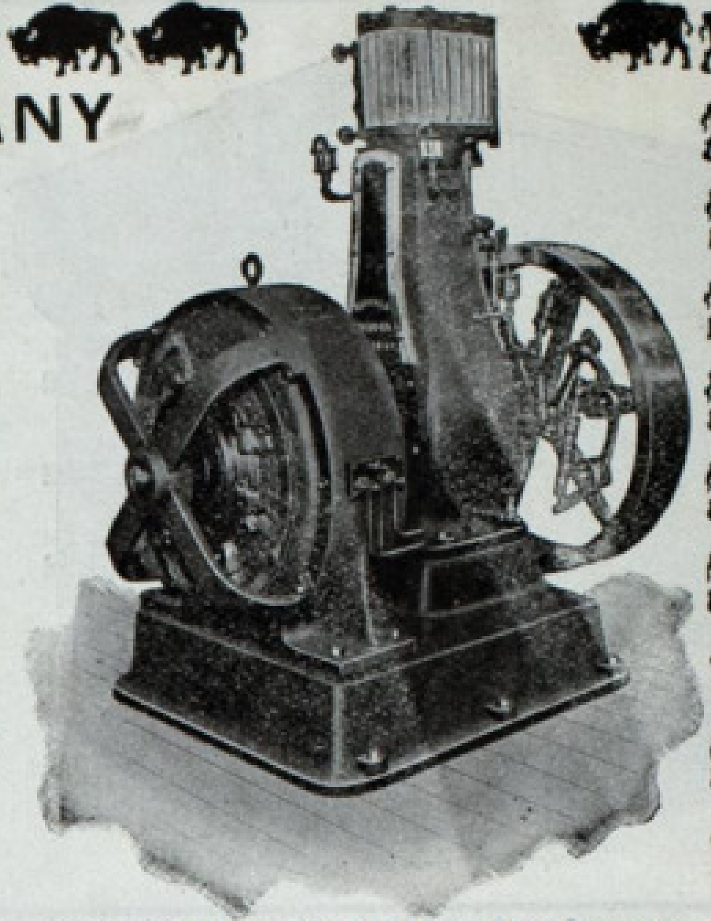
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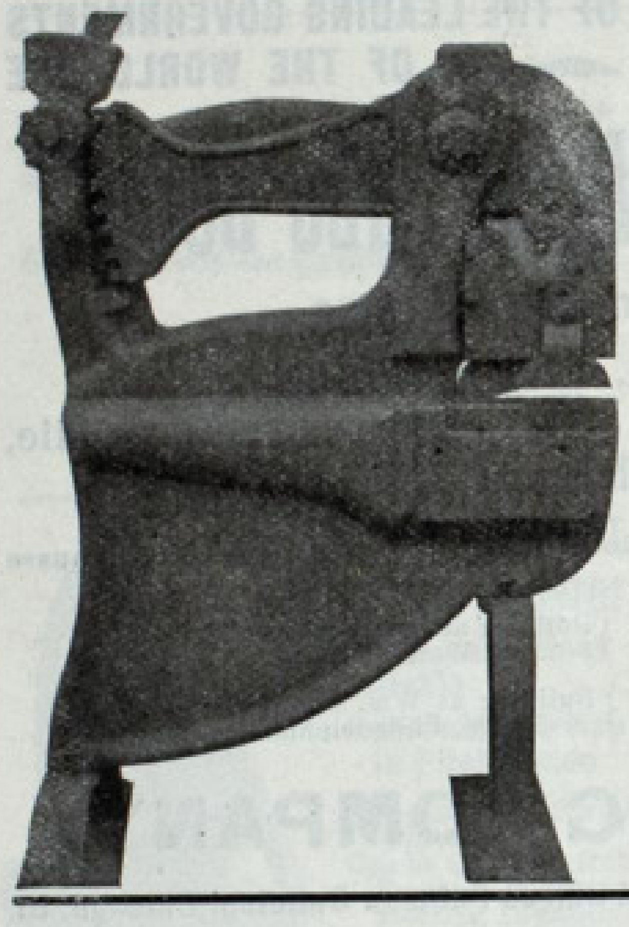

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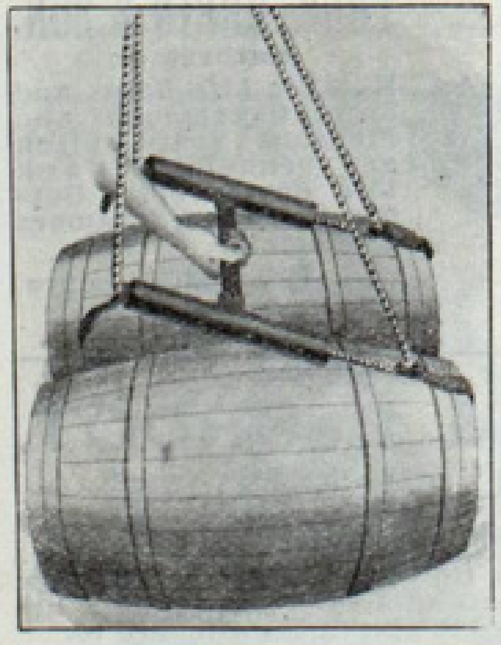

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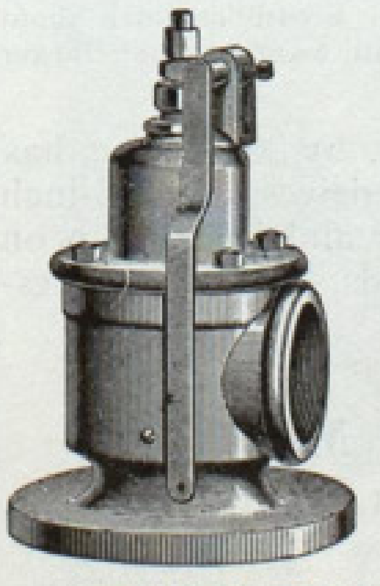

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